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Incorporating Food Industries Weekly

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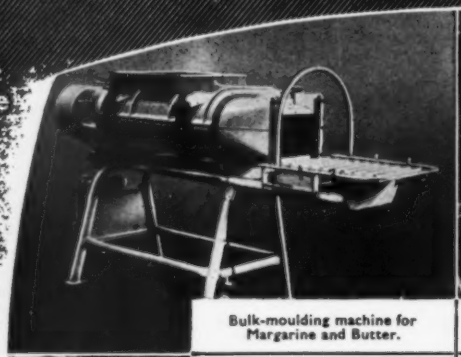

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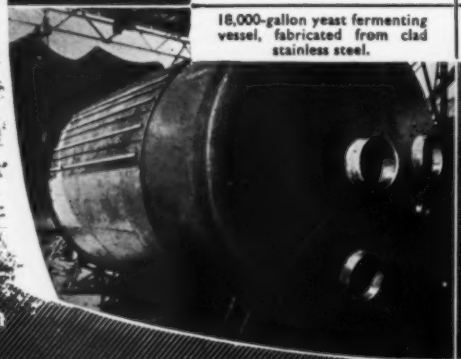

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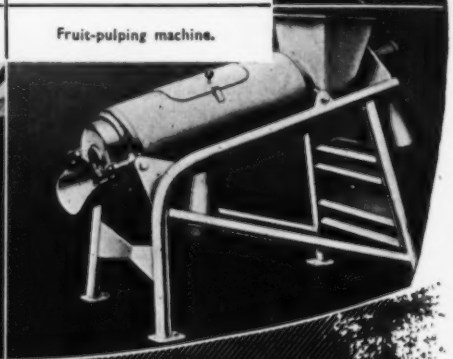

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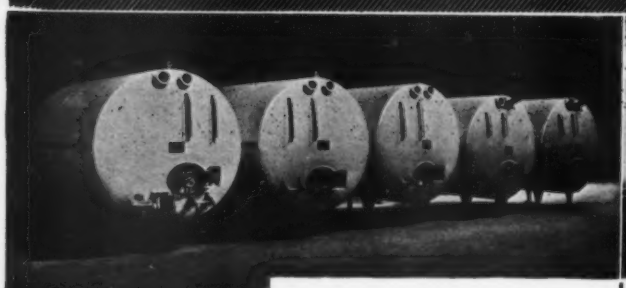

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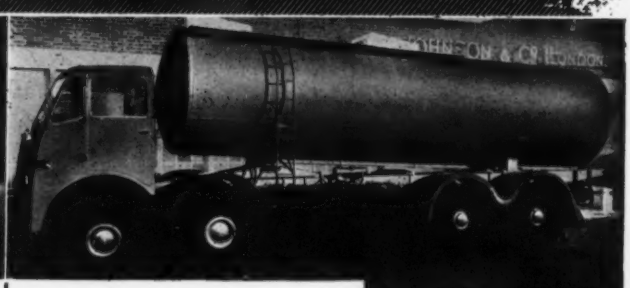

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FOOD MANUFACTURE

Vol. XXV, No. 9 September 1, 1950

Tomatoes and Cucumbers

TWENTY-THREE and a half pages of Hansard were necessary to record the debate on the proposal to set up a producer-controlled board with wide powers over tomato and cucumber distribution. The scheme received vehement opposition during the debate in the House of Commons as it was felt that the working of such a board would adversely affect the interests of the consumer. The scheme would confer powers for the regulation of the marketing in Great Britain of tomatoes and cucumbers by a board in the main elected by the producers of these commodities and in part appointed by the Minister of Agriculture.

One of the main arguments put forward against the scheme was that it did nothing to remedy the situation of too many middlemen handling products, that prices were thereby increased; that the product reached the consumer in a stale condition; and that its main result would be to secure better terms for the producer.

These criticisms were strongly refuted by the Minister, Mr. Tom Williams. As to bringing influence to bear on the regulation of imports to secure better terms for the buyer, he pointed out that in the case of tomatoes home production had gone up side by side with increased imports, and that there was no reason, so long as the quality of tomatoes produced in Great Britain was of a high order, why we should not continue to increase production and imports at the same time and give the consumer a reasonably good article at a cheap price.

Flour Extraction

As a result of the reduction in the rate of extraction of flour from 85 to 81 per cent., which took effect from August 27, and taking into consideration the prescribed addition of imported white flour, the extraction will be round about 80 per cent.

To the miller, the rate of extraction means the amount of flour obtained from wheat. The official calculation takes into consideration other factors such as products (bran and middlings) obtained, but roughly it means the percentage of flour obtained from clean wheat. To the man-in-the-street, it means the production of a whiter flour.

Since 1939 (control of flour milling was imposed at the outbreak of war), the extraction rate has been varied ten times. From the pre-war rate of about 70 per cent., it has moved to 73 per cent., 75 per cent., 85 per cent., 82½ per cent., 80 per cent., 82½ per cent., 85 per cent., 90 per cent. (in 1946, a year after the war was officially over) and then to 85 per cent., and this was maintained until August 27 this year, when it reverted to 80 per cent.

The large majority of the people of Britain have been clamouring for whiter bread for a long time, but have been obliged to put up with the darker bread of fluctuating grades for economic reasons put to them by the Government. These were first tied up with shipping considerations and, later on, with the sterling-dollar position.

As a result of the change there will probably be an increased consumption of bread, which has been steadily decreasing. There will be adequate supplies of wholemeal bread for those who really want it. The reduction in the extraction rate seems to be a strong pointer to the recovery of our economic position, and also indicates the extent of the increase in wheat production in Great Britain. Nor must be forgotten the increased food for cattle—20 per cent. instead of 15 per cent., a gain of 33⅓ per cent., with a resultant increase in eggs, butter, and pig products.

There are bound to be a few diehard critics, but the great majority of people will welcome the change.

Fatstock Marketing Plan

A scheme for the marketing of fatstock, including bacon pigs, as an alternative to the present system of Government purchase has been drawn up by the Livestock and Home-produced Meat Policy Committee, on which associations of livestock auctioneers and wholesale and retail butchers are represented.

The Committee claims that the proposals will assure to farmers both guaranteed prices, which they receive under the Agriculture Act, 1947, and the right to market their stock in any way they choose.

Butchers, it is stated, will be able to exercise their skill in buying and so provide consumers with meat of good quality at competitive prices.

Under the Committee's proposals, the " deficiency

payment" system that operated before the war in connexion with the wheat quota scheme would be applied to fatstock, and the scheme would be administered by the Livestock Commission constituted under the Livestock Industry Act, 1937.

Describing the scheme as "private enterprise with guarantee of price," the promoters state that purchasers of livestock and meat would buy what they like, where they like, at ordinary market prices. The producer would sell his stock either alive by auction or by private treaty, or on a dead-weight basis, to suit his convenience.

The producer would be paid the market price by the purchaser, plus a deficiency payment by the Livestock Commission. This deficiency payment would be calculated as the difference between the price guaranteed by the Government and the average market price for the class of animal concerned in the four-week period in which it was sold.

Similar principles would apply to the marketing of cattle, sheep, and pigs, although there would be differences in detail.

Organisation of the scheme would be centred on live-weight and dead-weight certification centres, including bacon factories. Certified stock would be marked to prevent their being certified a second time.

It is proposed that deficiency payments should be paid quarterly, and that the guaranteed prices should be so adjusted as to encourage an even flow of stock to the markets throughout the year.

The Committee believe that the scheme is the best practical means of giving effect to the statutory price guarantee for fatstock and the best long-term policy for ensuring the stability and prosperity of the livestock industry.

Food Preservation by Ionisation

At the recent dedication of the new research laboratories of the National Dairy Products Corporation at Oakdale, N.Y., Dr. Karl T. Compton, chairman of the Massachusetts Institute of Technology, in an address given to the nutrition conference, mentioned some of the latest research developments in connexion with the preservation of food, developments which were even more recent than the method of quick freezing.

One of them is the process of high vacuum, low temperature dehydration, or distillation, made possible by skilful application of very high speed vacuum pumps of types originally devised for research work in the physical sciences.

Newest of all is the work on food preservation by ionisation, which is still in the exploratory stage and is being sponsored by the High Voltage Engineering Corporation of Cambridge, Massachusetts. Some of the work is being done in the Food Technology Department of the Massachusetts Institute of Technology, principally under Prof. B. E. Proctor, and some is being carried out in other laboratories.

The work involves exposure of the food either to X-rays or to cathode rays emanating from a tube operating at two million volts. There is no difficulty in achieving sterilisation, and it is possible that this may be done on an economical basis. The real problem, other than the economics of the situation, is to find out whether adequate sterilisation can be accomplished without detrimental effects on the palatability of food or on its nutritional value. With milk, for example, there is deterioration of colour and taste, which is probably unacceptable. With cereals, the indications are more favourable.

Further developments will be awaited with interest by food scientists.

Mineral Glycerin

The system of classification—animal, vegetable, or mineral—is not like the laws of the Medes and the Persians; what might have been only yesterday is not still so today. The synthetic chemist is a revolutionary anarchist. For example, there is glycerin. Who would deny that this substance of innumerable uses is animal in origin, a product of animal fats? It has always been based upon fats, though there has been a very minor amount of war-time production using fermentation methods. Now, however, there is a £3 million factory in Texas producing pure glycerin from cracked petroleum; or, to be more accurate, from propylene derived from the cracking of petroleum. This synthesis has taken twenty years of laboratory research and ten years of pilot-plant work to achieve. Construction of the plant started in 1948; today rail tanks of glycerin are being despatched daily.

During the war German scientists made some progress towards synthesising edible fats from coal-derived hydrocarbons. Whether these fats were of very high value nutritionally is doubtful, but this post-war achievement of American chemistry and engineering is no less significant, although it has so far been given much less attention and publicity.

If glycerin can be increasingly based upon mineral oils, animal fats can be conserved. It is true that much of the glycerin produced has been based upon the animal fats used in soap manufacture and has been a by-product of saponification processes. However, taking a distant look into the future, modern detergents may well reduce the connexion between soaps and animal fats. With detergents and glycerin both based upon mineral oils, more of the world's fat resources can be devoted to nutritional uses. As populations increase, this may well be an essential deployment of fundamental raw materials.

Bacon Output Exceeds Pre-war Level

Home production of bacon has now exceeded the pre-war output, and there is reason to believe that further expansion will be made before the end of the year.

In the first five months of 1950 bacon production in the United Kingdom averaged 3,870 tons a week, compared with a weekly average for the whole of 1938 of 3,110 tons. From January to May, 1949, home production averaged only 2,350 tons a week. Every month during the current year has shown an increase in production, the weekly output rising from 3,280 tons in January to 4,650 tons in May.

The number of pigs sent to the curers this year shows an increase of approximately 50 per cent. over last year's figures, the weekly average in April, 1950, being 60,000 pigs against 40,800 in 1949. The weekly average in 1938 was 46,500 pigs.

A fact that has an important bearing on quality is that in 1938 the average weight of bacon produced per pig was 1·337 cwt., whereas in April, 1950, it was 1·50 cwt., an increase of ·163 cwt. or 18¼ lb. per pig. The extra weight, unfortunately, was mostly fat and represented a setback in quality.

It is not surprising, therefore, that Sir John Bodinnar, chairman of the Bacon Marketing Board, has suggested that at the next February review of guaranteed prices for farm crops and products a grading scheme for pigs should be introduced.

A survey made by bacon wholesalers recently showed that only 19 per cent. of English bacon had a shoulder fat measurement of not more than 2 in.; for Danish bacon the proportion was 56·4 per cent.; Dutch 77·5 per cent.; and for Canadian bacon 90 per cent. Wholesalers and curers have expressed the view that if home-produced bacon is to be well received by the consumer, it must attain the quality of the best imported supplies.

Sir John has suggested that a trial grading period for bacon pigs, with no price penalties, should be operated from October, 1950, until March, 1951, to give farmers time to produce better quality pigs before an actual grading scheme, with price bonuses and penalties, is introduced.

Plenty of Food?

The modern Malthusians, and even those who believe that starvation and malnutrition can be prevented by the better application of science to food production, have lost a good deal of ground in the past few months. In the United States food stores have been accumulating; here in Britain there has been a steady process of derationing. It is only too easy for the average citizen of America or Britain to believe that, after all, there is plenty of food in the world, that the problem of over-population and under-population has been greatly exaggerated. For Britain nothing would seem to stress this more than the groundnuts fiasco. Here was a vast scheme rushed ahead for fear of an interminable shortage of fats. It has caused great expenditure but yielded no fat. Now it is an economic and colonial problem —the world's fat situation having meanwhile righted itself.

Nevertheless, these easy opinions are not sound. Those, like Lord Boyd Orr, who gave so many warnings about food needs and food supplies were not thinking of a few large and highly industrialised nations. Theirs was a world viewpoint that saw the East as well as the West, that envisaged tomorrow's population figures as well as today's. America's accumulating stocks of foodstuffs are not a measure of world satisfaction—they are, as were the stores of foods in the 'thirties, expressions of lack of economic balance.

It is timely that as solid and well-known a leader as Viscount Bruce should have re-stated the unaltered facts of the world food problem. Many will not have noticed this significant contribution, for it was made in the Messel Memorial Lecture under the title "The Impact of Finance upon Industry." Lord Bruce pointed out that, as a result of the second world war, America's industrial production had risen by 100 per cent., while her agricultural production had risen by 30 per cent. After the first world war, the respective increases had been 30 per cent. and 10 per cent.

The only practical solution for bringing industrial and agricultural production into better balance was to develop new sources of wealth upon which world trade could be expanded, and for this we had to look towards the backward and predominantly agricultural countries. The world had never had enough food for general good health. Even today the world was totally producing only as much food as in 1939, though the world's population had risen by some 200 millions. The world has a smaller food supply *per capita* than it had before the war. Nevertheless, agriculture was the greatest industry in the world, employing 60 per cent. of the population; if it were not prosperous, the world could not be prosperous.

Much of the inspiration and impetus for developing the backward areas of the world must come from those countries whose own food situations are not reflecting the world situation. Should they adopt an isolated and self-interested attitude of "pull-the-ladder-up," the ultimate consequences can be incalculably serious. The old pattern of food stocks and hunger will repeat itself anew, and ever-expanding industrial capacity will look in vain for equally expanding purchasing power.

The practical and economic approach of Lord Bruce to this pressing world problem is a valuable supplement to the previous and mainly humanitarian approach of Lord Boyd Orr.

Processed v. *Fresh Foods*

The impact of growing volumes of cheap fresh food, mainly fruit and vegetables, is having a retarding effect on the sale of processed foods in Scotland. Quick frozen products have taken a particularly bad knock, if present mass market store sales are any criterion. Canned goods and other processed foods are also meeting competition from eggs, vegetables and fruits, and even fresh fish, now cheap and plentiful after a period of price uncertainty.

The controlling factor in every section is the lack of ready money and the urgent need to buy food cheaply. All the more expensive ranges are being avoided and concentration is on the food that offers the best value for money. The stores are encouraging this trend by making available huge quantities of surplus supplies. One store in Glasgow effected a bulk purchase of strawberries from England to sell retail at a shilling per lb. Every pound bought—and all was sold—meant a shilling withdrawn from other food buying for that week.

This situation is one which will undoubtedly develop and will force processors to reconsider their programmes, the chief item of which is a reduction in the prices of processed foods.

The fishing industry is faced with similar difficulties. Fresh fish can be got to most points from a coastal town within a matter of hours, making the need for freezing or refrigeration less urgent than in a climate where conditions and distance encourage both freezing and holding. With ample fresh supplies selling slowly, prospects of selling processed supplies are obviously limited.

If Music be the Food . . .

According to a certain school of thought, the way to a man's heart, popularly believed to be the seat of his emotions, lies through his stomach. It is not surprising, therefore, that songs and poems which provide a vehicle for mankind's outpourings are not restricted entirely to the *grande passion*, but often have been inspired by reflections on food. "A man seldom thinks with more earnestness of anything than he does of his dinner," remarked Dr. Johnson, and what could be more significant than that the yearning of the American soldier on the battlefield was for his Ma's apple pie rather than for his Ma.

There is no doubt that, in the nursery, food has established its popularity as a subject for verse. Half a pound of tuppenny rice, an equal amount of treacle, pease pudding hot or cold, are just a few of the commodities considered worthy of immortalising in rhyme, and one verse even goes so far as to challenge biological truths with the assertion that little girls are composed of sugar and spice among other things nice. But it is not only the children who indulge in such a means of expressing their innermost thoughts, as witness the fact that fully grown men have been heard to give vent to their almost childish delight at seeing a certain article of food once more make its appearance in the shops by bursting forth to the effect that they now have a lovely bunch of coconuts.

Whether it is owing to the paucity of modern songs of a sufficiently rousing character, or to the effect of years of rationing, the music hall and wireless programmes still have recourse to ancient ditties that treat of boiled beef and carrots, ripe cherries, nice cups of tea, not forgetting that appropriate song for the greengrocer, "Yes, we have no bananas!"

We have not yet mentioned the most classic jingle of the lot—Marie Lloyd's "A little of what you fancy does you good." This was dead and forgotten until some three years ago, when it became the vogue. During the reading of scientific papers, almost every lecturer quoted it roguishly and raised a laugh. Since then it has been impossible to attend a meeting dealing with food without hearing it, although it no longer raises a single snigger. Not so long ago the Minister of Food produced it almost with an air of having discovered a new phrase. But why be perverse? It is evident that the resources of the English language in the matter of describing food preferences go no further than the words of a comedienne, long dead.

Canning on Tristan da Cunha

According to reports, Tristan da Cunha has aspired to an export industry, that of canning crayfish. A group of three isles, rising abruptly from the sea, with Tristan itself the largest, yet with only 16 square miles of territory, provides the background to the inhabitants' efforts to maintain a bare existence by growing vegetables, wheat and oats, and raising pigs and cattle.

Frequent rain on a cold, rather barren volcanic terrain has at times proved too much for the small communities settled periodically by Dutch and English during three centuries. Thomas Currie with two others showed the way to survival; yet wheat crops often vanished, owing to the depredations of rats, while apples and peaches were grown with a struggle. During the years of effort the potato has proved the standby as it has in other communities verging on famine.

Today the hundred and eighty or so inhabitants, with a head man in control, have promise of yet a new lease of life. For a minimum of two days a week the men are employed by the canning company. This work, complementing their daily round on holdings, together with some seal fishing and gathering of seaweed, may in some measure alleviate the present austere life of the islanders.

Analysis of Tomato Purées and Ketchups

The analysis of tomato purées, ketchups, and similar preparations has hitherto involved lengthy chemical analytical procedures. The introduction of a new Order which specifies a minimum "tomato solids" content in such preparations will result in a great increase in the number of analyses that will have to be carried out and the need for a new rapid method of making the necessary determinations is very evident. Recently, a solution to this problem, based on the absorption spectrophotometry of organic extracts of purées, etc., has been suggested. Such extracts contain lycopene, the red colouring matter of tomatoes, and it is implicit in the method that the "tomato solids" content bears definite relation to the lycopene content of the preparation.

ONE of the stipulations of the Food Standards (Tomato Ketchup) Order[1] is that "tomato ketchup, catsup, sauce, and relish shall contain not less than 6 per cent. by weight of tomato solids derived from clean and wholesome tomatoes or from tomato purée or its equivalent made from clean and wholesome tomatoes." This Order came into force as respects sales by the manufacturer on April 1, 1950, as respects sales by wholesale on July 1, and will be operative with regard to retail sales on October 1, 1950.

Although there has hitherto been no statutory obligation on manufacturers to observe a minimum "tomato solids" content in their tomato preparations, the determination of "tomato solids" has been widely practised.

Imported Purée

Most of the tomato products made in Great Britain are probably prepared from imported concentrated purée. Morpeth[2] investigated such purées and found that they might contain anything from 9 to 44 per cent. of dry tomato solids, with 27 to 30 per cent. as a commonly occurring value. Clearly it is necessary for the British manufacturer to be able to assess the value of what he is buying, and for this reason, as well as for others, the determination of "tomato solids" has assumed importance. More recently Stock[3] has listed the "tomato solids" contents of seventeen purées imported from Italy, Portugal, Hungary, France, Canada, South Africa, and Australia. The lowest "tomato solids" value was 21·9 per cent. and the highest was 35·5 per cent., and ten of the seventeen samples were within the range 25 to 30 per cent. This indicates that there is some sort of uniformity in imported concentrated purées, but that at the same time the differences are sufficiently great to make an accurate method of determining the "tomato solids" content imperative.

Two canned unconcentrated purées, one from Australia and the other from New Zealand, contained 10·3 per cent. of "tomato solids."

Chemical Methods of Estimation

The earliest methods of determining the "tomato solids" content of ketchups, etc., involved assumptions that were of too wide and general a nature for general acceptance.

Thus Bigelow, Smith, and Greenleaf[4] put forward two methods:

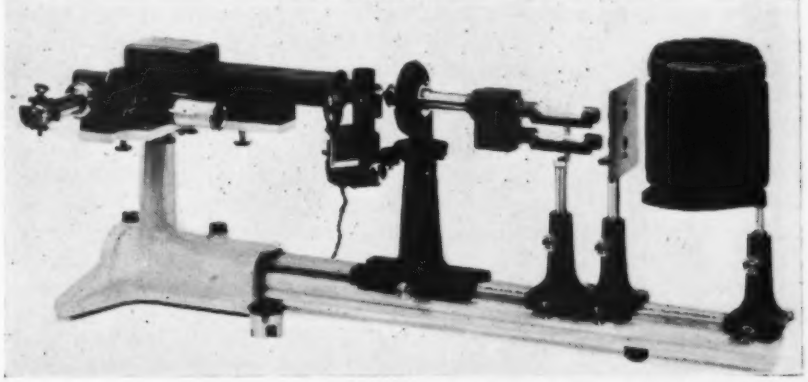
1. The total solids, the sugar and salt contents of a ketchup were estimated and then it was assumed that the non-sugar solids were just one half the total solids, so that by deducting the sugar and salt content from the total solids and halving the residue, a figure was obtained which was taken as a measure of the "tomato solids" content.

2. The insoluble solids of a tomato purée were determined and the assumption was made that these represented one-eighth part of the total solids.

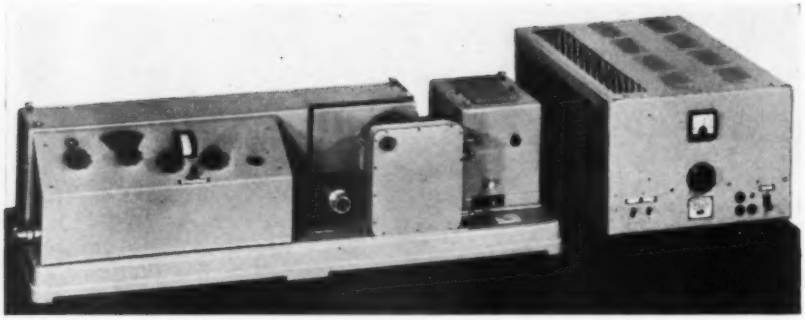
The assumptions in these methods are difficult to accept and it is fairly evident that the results obtained will be unreliable. Many factors, as Lo Coco[5] has observed, contribute to irregularity of product even with a constant "tomato solids" content; variety of tomato, degree of ripeness, climatic conditions, and soil composition all contribute to such variations.

Morpeth's Method

Morpeth[2] undertook an investigation to find if it were possible to estimate the tomato content of a ketchup. His analysis was in the first place similar to the methods used for jam analysis, but in addition the potash contents of tomato purées were determined. The main determinations centred round total solids, insoluble solids, free acids, total fruit and sugars, ash, and potash; results were assembled for a large number of



Visual spectrophotometer of the Hilger Nutting type, consisting of constant deviation spectrometer in conjunction with a Hilger Nutting photometer and light source.
Photo Hilger and Watts.



A photo-electric spectrophotometer suitable for the spectrophotometric estimation of lycopene.
Photo Hilger and Watts.

preparations (purées and ketchups).

Tomato contents of ketchups and purées of unknown origin were calculated by calibration from the analyses of results on samples of known composition. If, for example, it was noted that free acids usually constituted a given fraction of the "tomato solids," then a free acid determination on an unknown sample enabled its "tomato solids" to be calculated. Similarly values for "tomato solids" could be calculated from combined acid, from potash, and from other characteristics; the values obtained were averaged, and when the method was checked with samples whose constitution could be ascertained, it was found that "it should be possible to obtain an estimate of the 'tomato solids' in a ketchup to within something like 10 per cent. of the true value, provided that purée of average composition has been used. On the potash value alone a slightly better estimation can be made." Potash (as K_2O) averaged about 4·8 per cent. on the total solids.

A disadvantage of the analytical method described by Morpeth is that it is rather lengthy and laborious for routine estimations, and any method which could enable a large number of determinations of "tomato solids" to be made rapidly would be of value.

Colorimetric Estimation

Darbishire[6] suggested the use of oil-soluble colour as a measure of tomato content. The objection to this method is that lycopene, the oil-soluble colour, varies greatly with the degree of ripeness of the tomatoes. In practice an extract of the tomato preparation is made in light petroleum of b.p. 100°-120° C.: the extracts are then filtered and matched for colour in the Lovibond-Schofield tintometer using a 3 inch cell. The visual density due to the yellow and red components of the colour is read off from the calibration curve supplied with the instrument, and from this the visual density for a 1 per cent. extract in a 1 cm. cell is calculated. This can then be related to the solids content to give a value "Vs" which is the product of the visual density and of the solids content.

An Adjunct to Analytical Procedures

In dealing with an unknown tomato product, an estimate of tomato solids content can thus be made by comparing the determined visual density with the visual densities of products of known tomato solids content. In Darbishire's words: "The preliminary results obtained by this method suggest that it might be of use as an adjunct to analytical procedures such as the determination of potassium and citrate. Moreover, except in the rather unlikely event of there being added oil-soluble colours present, it is fairly specific and suitable for dealing with low tomato concentrations."

The addition of apple or swede to tomato preparations is illegal, but if it were attempted any method which depends on lycopene estimation would make such addition worthless. Even if colour were increased by the addition of a dyestuff, this would probably be water-soluble and would not therefore affect a determination of lycopene from oil-soluble colour. If an oil-soluble dyestuff were used, Stock's method[3] would reveal its presence, as the shape of the absorption curve would be different from that of lycopene.

Constitution of Lycopene

The colouring matter of tomatoes early attracted attention. In 1903 Schunck[7] showed that the red colouring matter was different from carotene. In 1910 Willstätter and Escher[8] isolated a considerable quantity of lycopene and showed that it was an unsaturated hydrocarbon. Its exact constitution was finally worked out by Karrer and his colleagues[9] who, in 1930, examined the oxidation products of both carotene and lycopene. Lycopene was degraded to methyl heptenone, $C_8H_{14}O$, and lycopenal, $C_{32}H_{12}O$, and this was further degraded to more methyl heptenone and a dialdehyde, $C_{24}H_{28}O_2$, which yielded β-norbixin through the dioxime.

Carotene is responsible for the yellow colour in tomatoes, and is the same as is found in carrots. Lycopene is also to be found in carrots, although only in small quantities. Harper and Zscheile[10] identified it in numerous varieties.

According to Vogele,[11] the formation of lycopene in tomatoes reaches an optimum at 24° C., and ceases at 30° C. If, for example, tomatoes are ripened at 32°-38° C., then they are yellow and not red, although they will turn red, by synthesis of lycopene, if they are removed to a lower temperature within the range 20°-24° C. The presence of ethylene in the atmosphere was found to accelerate lycopene production, whereas a diminution of the oxygen supply retarded it. Lycopene is synthesised as rapidly in the light as in the dark.

Spectrophotometric Estimation

A method for analysis of mixtures of lycopene, β-carotene, and leaf xanthophyll developed by Miller[12] depended on the photoelectric spectrophotometry of two or more wavelengths per sample per component. Provided that each component constituted at least 10 per cent. of the total pig-

ment content, results agreed with an error of only 2 per cent.

There is usually no great difficulty in obtaining consistent results by spectrophotometric analysis. The only factor that is doubtful is whether the property that is being measured, *e.g.* intensity of redness due to lycopene, can be taken as a fair representation of what is wanted, viz. the "tomato solids" content.

Spectrophotometry of lycopene may also throw light on its stereostructure. Zechmeister *et al.*[13] have shown that in the *cis* and *trans* lycopenes the bending of a carotenoid molecule by *trans-cis* isomerisation causes the appearance of a new spectral maximum in the ultra-violet region. This phenomenon was made use of for a closer investigation of members of the lycopene stereoisomeric set.

Absorption Spectroscopy

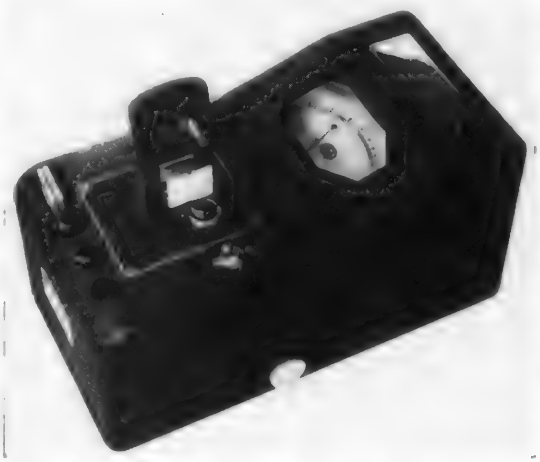
The applications of absorption spectroscopy in the analysis of organic materials become increasingly numerous. One of the main advantages of the method is that once the necessary equipment has been purchased and installed, routine analyses can be carried out rapidly and usually with a fairly simple technique for the preparation of the samples.

The application of this method to the determination of "tomato solids" in tomato ketchup, catsup, sauce, and relish has recently been described by Stock,[3] and it is especially topical in view of the Order relating to "tomato solids" content.

The Food Standards (Tomato Ketchup) Order,[1] although specifying a "tomato solids" content of not less than 6 per cent. by weight, does not define "tomato solids," nor does it prescribe a standard method for determination. Stock estimates the "tomato solids" by taking 5 g. of the purée (or other preparation), adding a little water, drying to an even film on the water bath for about an hour, followed by oven drying for an hour at 100° C. This method enables standards to be prepared for spectroscopy, and these can then be used to calibrate spectrograms of samples of unknown composition.

Lycopene is soluble in some common organic solvents, notably light petroleum, chloroform, and carbon disulphide; the solutions it gives are intensely red and show a strong absorption band, the maximum of which varies a little with the particular solvent used; this difference can be seen also in the appearance of the lycopene solutions as illustrated in the table.

Solvent	*Colour of Solution*	*Maximum Absorption*
Light petroleum	Yellowish red	5,050Å and 4,750Å
Carbon disulphide	Quite red	5,450A and 5,050Å



A compact portable instrument designed for accurate routine colorimetric analysis.
Photo Evans Electroselenium.

The higher wavelengths of the absorption maxima in carbon disulphide, compared with those in light petroleum, account for the greater redness of the carbon disulphide solution.

The estimation of the "tomato solids" depends on the estimation of the absorption of light at 5,050 Å by the lycopene in light petroleum solution. A factor is found by calibration of standard solutions to convert micrograms of lycopene to grams of "tomato solids."

The method of estimating lycopene consists of three stages:

1. Separation of the lycopene by extraction.
2. Measurement of the absorption by a petroleum solution of the lycopene of light of wavelength 5,050 Å.
3. Calculation of the amount of lycopene present and thence, by calibration, of the amount of "tomato solids" present.

In effect, the red colouring matter of tomatoes is isolated from the ketchup or other preparation, the quantity measured spectrophotometrically, and the amount of tomatoes taken to be proportioned to the amount of the red colouring matter present.

Extraction of Lycopene

In the method recommended by Stock, a 5 g. portion of the tomato purée, sauce, or ketchup is mixed with sufficient sand to make a powdery mass, and this is dried in a vacuum desiccator for sixteen hours; then the powder is thoroughly ground. The powder is packed tightly into the liner of a Bolton extractor; it is then extracted for three hours with acetone shielding from bright sunlight. The acetone is evaporated and the residue, which consists of about 90 per cent. lycopene, 10 per cent. carotene, and a small amount of xanthophyll, is dissolved in light petroleum (b.p. 80°-100° C.), and made up to 150 ml. This method extracts 95-98 per cent. of the lycopene present in the tomato preparation, 85-90 per cent. being extracted in thirty minutes, but it is preferred to continue the extraction for three hours to obtain the higher extraction. Extraction longer than three hours it not worth while.

Duplicate determination of the absorption at 5,050 Å by the lycopene solution in light petroleum in a 1 cm. cell is made, using a constant deviation spectrometer in conjunction with a Hilger photometer; a ribbon filament lamp is employed as a light source.*

Excellent results were obtained when the lycopene content determined by comparison with stan-

* *A Pointolite lamp would be equally suitable.*

dard solutions was related to "tomato solids" on nineteen samples of purée. The "tomato solids" content was taken as "total solids" less salt content. For each gram of "tomato solids" present there was between 1,462 and 1,856 micrograms of lycopene. It was therefore assumed that 1 g. of "tomato solids" contains a minimum of about 1,500 micrograms of lycopene, and this figure was taken as a basis for future analysis. The method does not claim great accuracy, "but it gives a definite indication of 'tomato solids' content, and is undoubtedly a good 'sorting-out' test, which may be used in conjunction with other methods of analysis. The analytical procedure involved is very simple, and the determination rapid."

Ripeness of Tomatoes Used

A method which depends on the determination of the lycopene content is clearly likely to be affected by the ripeness of the tomatoes used in the preparation of the purée. Obviously, if green tomatoes are used, there will be a very low lycopene content, and any value obtained for "tomato solids" by using the equivalence factor of 1,500 micrograms lycopene = 1 g. tomato solids will be very low.

Normally, both green and overripe tomatoes are excluded from purée; the former give a poor colour to the purée, and the latter are subject to mould. If the assumption can be made that the purées are in fact prepared from ripe wholesome fruit, it is likely that the method of estimating "tomato solids" by determining the lycopene content will give consistent and accurate results.

Tomato Preparations

Stock considers that a comparison of the absorption values at 5,050 Å (lycopene) and 4,750 Å (carotene) can be used to determine the ripeness of the tomatoes used in any preparation. For example, ripe tomatoes contain ten times as much lycopene as they do carotene, but half-ripe

(*Continued at foot of next columns*)

tomatoes contain only twice as much, and green tomatoes actually contain less lycopene than carotene.

There is also the possibility that if the main method for the determination of tomato solids from the lycopene content is vitiated in any particular tomato preparation by the presence of unripe tomatoes, it will be possible to detect this by a comparison of the absorption at 5,050 Å with that at 4,750 Å.

This method appears to offer a means of rapid determination of "tomato solids" with reasonable accuracy, but it should occasionally be checked by determination made by Morpeth's chemical methods; these methods will also be necessary to prepare standards to be used for comparison.

REFERENCES

1. The Food Standards (Tomato Ketchup) Order, No. 1817, 1949.
2. J. C. Morpeth, *Analyst*, 1948, **73**, 449-457.
3. F. G. Stock, *ibid.*, 1950, **75**, 117-126.
4. W. D. Bigelow, H. R. Smith, and C. A. Greenleaf, "Tomato Products" Bull. No. 27—L, 1941 National Canners' Assn., Washington.
5. G. Lo Coco, *Food Research*, 1945, **10**, 114.
6. O. B. Darbishire, *Analyst*, 1948, **73**, 457-458.
7. C. A. Schunck, *Proc. Roy. Soc. London*, 1903, **72**, 165.
8. R. Willstätter and H. H. Escher, *Z. physiol. Chem.*, 1910, **64**, 47.
9. P. Karrer, A. Helfenstein, H. Wehrli, and A. Wettstein, *Helv. chim. Acta*, 1930, **13**, 1084.
10. R. H. Harper and F. P. Zscheile, *Food Research*, 1945, **10**, 84-97.
11. A. C. Vogele, *Plant physiol.*, 1937, **12**, 929-955.
12. E. S. Miller, *Cereal Chem.*, 1938, **15**, 310-316.
13. L. Zechmeister, A. L. Le Rosen, W. A. Schroeder, A. Polgár, and L. Pauling, *J. Am. Chem. Soc.*, 1943, **65**, 1940-1951.

Packing for the Canadian Market

BASED on an idea originally suggested by the U.K. Senior Trade Commissioner in Ottawa in response to a number of suggestions that U.K. manufacturers should consider devoting special attention to the packaging of their products in order to increase their Canadian sales, a recently published report* contains a full account of how the necessary survey was carried out.

The report, which is solely concerned with the display rather than the protective side of packaging, deals with packages as delivered over the counter to the purchaser and with the direct influence of these packages on sales.

For convenience the main report is preceded by a summary of its general findings, prominent among which is the great importance attached to the use of full bright colours, transparent film and sheet, and simple abstract patterns giving an impression of smartness and modernity.

Included in the products which the report studies in detail are biscuits, sauces, etc., jams, jellies, and marmalades, pickles and relishes, and sweets.

The report deserves the particular study of firms interested in exporting these products to Canada, but it should prove of wider interest for three reasons:

(*a*) It contains, incidentally, a good deal of factual information about other marketing problems in Canada and the Canadian market generally.

(*b*) The discussion of packaging for the Canadian market is worth consideration by firms who sell packaged products other than those specifically dealt with.

(*c*) It introduces the technique of market research to exporters to whom it may be relatively unfamiliar. The Board of Trade is specially concerned to dispel the illusion that market research is some mysterious art. It is a straightforward practical job which can be of considerable value to exporters, especially in the dollar markets.

Intended as a contribution to the service of providing manufacturers and exporters with a steady supply of factual information about the problems and prospects of the North American markets, the report is regarded as one of the most important methods by which practical help can be provided for the dollar exporter.

* *Packaging Consumer Goods for the Canadian Market*. A report to the President of the Board of Trade by BETRO. Pp. 102+iv. H.M.S.O. London. Price 3s. net.

An Encyclopaedia of Dairying

THE appearance of a book* written by an authority on his subject may be described as an interesting event, especially when the author has secured the collaboration of no less than twenty-nine contributors who have made some particular ramification of the subject their life's work.

Its encyclopaedic form facilitates reference, the advantage of which will be obvious when it is realised that the book contains over 760 pages of text and nearly half a million words.

It is difficult in reviewing an encyclopaedia to pick on any item for special comment. It is also difficult for the author of such a book to preserve a balance in the treatment of the different items and the amount of space accorded to the practical as differentiated from the scientific sides, but this balance has been admirably maintained by Dr. Davis.

In such a monumental work, the subjects have of necessity been treated with economy, but the essential outlines have been given, together with references to the literature. Those whose work includes searches in the literature will appreciate the value of this. How many of us have painfully ploughed through journals and books only to find a tithe of what we seek! The indications to specific items in the literature alone make the possession of this book worth while.

In his preface, Dr. Davis mentions that "some sections have received more extensive treatment than others because of the lack of suitable treatment elsewhere." One of these is the item on bottle washing which runs into eleven pages of closely printed matter, in addition to illustrations and line drawings. After general principles have been explained, there follow descriptions of the different methods, from hand-washing to the use of high-speed automatic machines; the numerous problems likely to be encountered are also pointed out.

A flip of the pages will discover for the reader an admirable exposition on the whole subject of detergents both in connexion with bottle washing and other uses.

Again, the chapter on ice cream provides a clear survey of the subject, in which the practical and the scientific angles are deftly blended.

However, the foregoing examples are among the hundreds of items which could be discussed, and have been picked out at random.

The printing is good and the headings to the items stand out clearly. The numerous half-tone illustrations and line drawings supplement the text, and the references to the literature appear at the foot of the page in which the subject is discussed—one of the features of this book which ensures the ease with which the busy, or even hurried, executive and others can find what they seek.

In these days of high costs, the encyclopaedia is extraordinarily low-priced, but there is nothing cheap about its format or binding. Its publication will undoubtedly be welcomed in all departments of the dairy world.

* *A Dictionary of Dairying*. By J. G. Davis, D.Sc., Ph.D.(Lond.), F.R.I.C. Pp. 856+xx. Leonard Hill Limited, London. Price 37s. 6d.

How to Make Chocolate and Confectionery

THE rapidity of development in the technology of the confectionery industry has been reflected in a book* just published. Bringing the subject up to 1950, it will be welcomed by confectioners, engineers, and also technical students undertaking courses in chocolate and confectionery production.

Following an interesting little historical chapter, sugars, scientific control, colloids, raw materials, chocolate and sugar confectionery plant, and wrapping machines are dealt with, after which follow chapters on the individual classes of chocolate and sugar goods in which typical formulae are given and processes clearly and concisely described. As far as the latter are concerned, the author stresses that they are based on personal experience, which must needs increase the confidence of the reader. The two final chapters are devoted to factory organisation and research.

The short chapter on research will be stimulating to those interested in future developments, although its value would have been enhanced by the inclusion of references to the literature. The application of ultrasonic vibration to emulsification, particle comminution, and other operations is briefly mentioned, and it is the author's considered opinion that plant manufacturers would be well advised to watch these developments closely.

The book is copiously illustrated with all types of the latest plant and equipment, together with descriptions of their working and capacities, which will be invaluable not only to the confectioner who wishes to bring his plant up to date, but also to those contemplating entry into the industry. Having acquired the plant, he will be able to get on with the job by means of the comprehensive processing instructions.

* *Chocolate and Confectionery*. By C. Trevor Williams. Pp. 216+xviii. Leonard Hill, Ltd., London. Price 25s.

Our Contemporaries

BALL and roller bearings are today used in all machines where it is desirable to transmit work and energy into rotary motion, with the least amount of energy loss through friction. It is not just a matter of inserting a ball or roller bearing in the desired position; the bearing needs care and attention in the form of maintenance just as with any other machine part. Of the many aspects that fall within the wide limits of maintenance, lubrication is possibly the most important, and an article dealing with the principles of lubrication appears in the May issue of *Petroleum*.

Active investigations into the ion exchange in water purification and beet sugar processing are described in the August issue of *International Chemical Engineering*.

Ministry of Food

LATEST STATUTORY INSTRUMENTS

The list given below is the continuation of the list of Instruments published in "Food Manufacture," July 1, 1950, page 274.

No.	*Date 1950*	
		PRICE FIXATION
770	May 21.	The Bacon (Control and Prices) Order, 1950. Revokes S.R. & O. 1944, No. 164; S.I. 1948, No. 183.
848	,, 28.	The Milk (Great Britain) (Directions) Order, 1950. Revokes S.I. 1950, No. 53.
872	,, 28.	The Syrup and Treacle Order, 1950. Revokes S.R. & O. 1941, No. 42 and S.I. 1949, No. 1040.
893	June 1.	Order revoking the Rabbits and Hares (Control and Maximum Prices) Order, 1944.
		CREAM
876	June 1.	The Cream Order, 1950. Revokes S.R. & O. 1940, No. 1714.
		EGGS
860	May 28.	Order amending the Eggs (Great Britain) Order, 1949, and the Eggs (Northern Ireland) Order, 1949. Revokes S.I. 1950, No. 327.
		FLOUR
1003	June 21.	Order amending the Flour Order, 1947. Revokes S.I. 1948, No. 1654.
		FRUIT
844	May 28.	Order amending the Dried Fruits Order, 1949.
		FRUIT AND VEGETABLES
616	Apr. 23.	Order amending the Bananas Order, 1948.
675	,, 30.	The Home Canned Fruit and Vegetables Order, 1950. Revokes S.R. & O. 1946, No. 1724; S.R. & O. 1947, Nos. 333, 1317, and 1979; S.I. 1948, Nos. 397 and 1884; S.I. 1949, Nos. 694 and 1726.
676	,, 30.	The Imported Canned Fruit Order, 1950.
		LICENSING OF WHOLESALERS
913	June 11.	Order amending the Food (Licensing of Wholesalers) Order, 1949.
		MEALS IN ESTABLISHMENTS
699	May 2.	Order revoking the Meals in Establishments Order, 1946, and the Meals (Service at Social Functions) Order, 1947.
		MEAT
785	May 21.	The Meat (Rationing) Order, 1950.
		NUT KERNELS
614	Apr. 23.	Order revoking the Nut Kernels Order, 1947.
		POINTS RATIONING
641	Apr. 23.	Order amending the Food (Points Rationing) Order, 1949.
789	May 21.	The Rationing (Personal Points) Order, 1950.
		POTATOES
928	June 11.	Order amending the Ware Potatoes (1949 Crop) (No. 2) Order, 1949. Revokes S.I. 1950, No. 248.
930	,, 11.	Order amending the Potatoes (General Provisions) Order, 1948. Revokes S.I. 1949, No. 1019.
		PRESERVES
556	Apr. 5.	Order revoking the Preserves Order, 1947.
		RATIONING
790	May 21.	The Food Rationing (General Provisions) Order, 1950. Revokes the Food Rationing Orders, 1949.
794	,, 21.	The Soap (Licensing of Manufacturers and Rationing) Order, 1950. Revokes S.I. 1949, Nos. 973, 1255, and 1872.
796	,, 21.	The Fats, Cheese and Tea (Rationing) Order, 1950.
898	June 4.	Order amending the Meat (Rationing) Order, 1950.
		SHIPS' STORES
1134	July 16.	Order amending the Ships' Stores Order, 1950.
		SOFT DRINKS
596	Apr. 19.	Order amending the Soft Drinks Order, 1947. Revokes S.I. 1949, No. 1878.
		STARCH FOOD POWDERS
982	June 18.	Order amending the Starch Food Powders (Control) Order, 1944.
		SUBSTITUTES
929	June 11.	Order revoking the Food Substitutes (Control) Order, 1941.
		SUGAR
613	Apr. 23.	Order amending the Sugar (Rationing) (No. 2) Order, 1949.
783	May 21.	The Sugar (Rationing) Order, 1950.

Food and Mankind

JOHN YUDKIN, Ph.D., M.D., M.R.C.P., F.R.I.C.
Professor of Physiology, King's College of Household and Social Science, University of London

The history of mankind is very much the history of man's search for food. With the discovery of cereals, which not only meant the relatively prolonged cultivation of the soil, but also gave an easily stored food, there came the possibility of a change from a nomadic, hunting existence to small settlements in the centres of areas devoted to the growth of wheat, rice, and maize. Later, as man found that he could cultivate cereals and domesticate animals so as to give food for more than his own family or village, there came the possibility of the development of an urban as well as a rural civilisation. In this way food became a trading commodity, no longer produced by the self-sufficing unit of family or village only for its own consumption, but produced by one section of a large community as a means of barter for goods made by other sections of the community.

MALNUTRITION, famine, and starvation have been man's lot since the beginning of his existence. The drive of industrialisation which a century ago was expected automatically to fill his life—and his belly—with all his needs has instead been found only to raise quite different problems.

Yet in the last decade man's conscience has more and more been awakened to the belief that, with the potential riches at his disposal, with his vast though still embryonic scientific knowledge, the problem of feeding himself and his world family could be solved.

There are three main aspects of this problem: (1) Can the earth produce enough food for its inhabitants? (2) Can the food be equitably distributed among the different countries, according to their population? (3) Can the food be equitably distributed among the population of each country, according to their individual requirements?

World Food Production

A superficial glance at the situation ten years ago might lead to a bewildering contradiction. On the one hand, there were indications that the world was already producing too much food. Some of the chief food-producing countries were adopting restrictive practices, such as limiting the areas to be planted with grain, or burning tons of wheat and coffee, or pouring away thousands of gallons of milk. Yet side by side with this were the ever-recurring famines in countries such as India and China with, in the intervening years, stunted growth, ill-health, pestilence and misery, affecting more than a third of the world's inhabitants.

It does not need much enquiry to make it quite clear that the "overproduction" of food was a tragic mirage and "lack of demand" an ironic misnomer. Those whose consciences were stirred by the thought of the millions who hungered while food was destroyed began to speak of "poverty in the midst of plenty." It is certainly true that millions might have been fed and hundreds of thousands might have lived who otherwise starved to death if the distribution of food could have been better organised. But was there in fact ever enough to go round? The answer is most emphatically "No."

With our present nutritional knowledge it is possible to make reasonably intelligent estimates of the amount of food required to feed the whole of mankind.

Twofold Increase Necessary

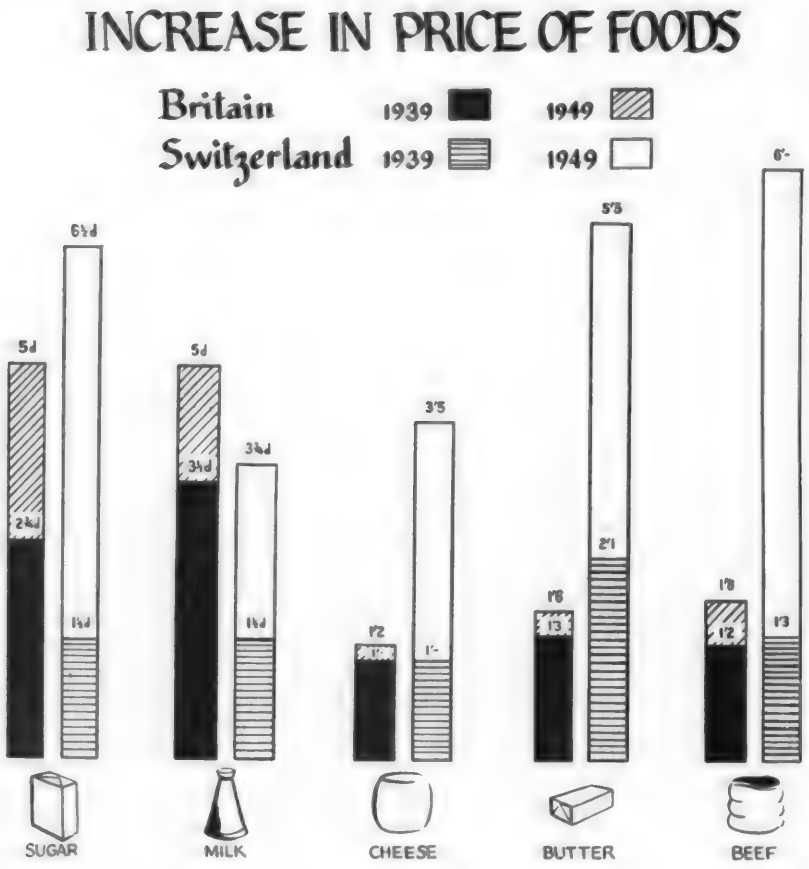
It will serve the purpose if it is simply said that an increase of food by something like twofold is needed in order adequately to feed humanity. Is such an increase possible? That is a question which cannot be definitely answered, but it is certainly agreed that enormous increase in food supplies is possible. For this to occur, three separate problems must be tackled. First, it is necessary to prevent the wastage and loss of food after it has been produced. Secondly, since by far the greater part of our food comes from the soil, it is necessary to prevent the loss of soil which is occurring in alarming proportions over most of the world's surface. Thirdly, it is necessary to improve the techniques at our disposal to achieve greater yields of food.

How much food is lost after it is produced, by pests, infestation, and disease, we do not know. One authoritative estimate is that about one-fifth of the total grain is destroyed each year—an amount which would be enough to keep alive 300 million people. Here is certainly a field for energetic investigation and action.

Losses through Soil Erosion

The second problem of increasing food production is that concerned with the loss of good soil. We have only to look at the once fertile fields of Greece, North Africa, and Palestine to realise the devastating results of soil erosion, and a farmer from the Middle West United States need not even bother about history and geography—he has seen himself how fertile fields can be converted into arid, dusty deserts. This insidious but still disastrous process can be truly appreciated only when its extent is realised. In the United States alone, 8,000 acres daily are being lost by soil erosion —2½ million acres a year. In that country, probably some 300 million acres have already been lost, an area which could produce enough food for 10 per cent. of

Abstracted from a lecture delivered at the Conference on Science and Food Rationing held at University College, London, on April 29, 1950.



the present population of the world. Of the whole cultivated surface of the earth, some 3,000 million acres, soil is being lost at the rate of 10 to 20 million acres a year—good, rich soil, an inch of which may take 500 years to form and which, with all our scientific and technical ingenuity, we cannot fashion ourselves.

Soil Conservation

The prevention of erosion requires a co-ordinated programme involving vast projects of reafforestation. Implementation of such a scheme means the vesting in some authority of powers to take action for the wider interests of the community against the immediate interests of individual farmers, timber concessionaires, and the like. This is perhaps why the most noteworthy measures for soil conservation are to be seen on a small scale in Israel and on a very large scale in the U.S.S.R. In Israel they are possible because of the self-sacrificing idealism of the pioneers, who have literally been able to make the desert bloom like the rose. In the U.S.S.R., for good or ill, private interests are subordinated to communal ones, rendering possible the vast plan, published recently, of reafforestation and land improvement to be carried out over the next fifteen years in European Russia.

The third method of increasing supplies of food is to improve and increase production. In large areas of the world, agriculture is still being carried on in a primitive way, with primitive instruments, inadequate mechanical aid, inadequate fertilisers, and inadequate schemes of irrigation. Improvement of all these, possible only in many countries by almost revolutionary changes in their economic situation, could go a long way to improving yield. There are also prospects of improving varieties of both animals and plants used for food. Artificial insemination promises greatly improved breeds of cattle, both for meat and milk. The development of new strains of cereals, such as wheat which can grow in Alaska, Northern Canada, or Northern Russia, also promises to help in solving the problem of increasing food supplies.

Again, the East African groundnut scheme is a praiseworthy concept of great magnitude, likely to prove an important example of the fuller and more efficient use of potential resources of food.

The elimination of diseases such as those of wheat or potatoes or cattle would greatly affect the yield of food. For example, the available figures concerning bovine mastitis lead to the belief that this disease, which could be almost entirely eliminated by treatment with penicillin, is responsible in Europe for the loss of about 1,500 million gallons of milk each year, enough to give one pint a day to more than 30 million people.

Speculative Schemes

Other possibilities, which are, however, more speculative, also present themselves as possible methods of increasing world supplies of food. Among these are projects for fertilising enclosed or nearly enclosed seas in order to increase the yield of fish, and projects for the growth of food yeast on media derived in the main from wood or from useless plant products. What such schemes may eventually mean to satisfying a hungry world we can at this time only guess, but foresight demands that these as well as other methods should be thoroughly investigated.

Problem of Increasing Population

The question of total supplies of food is of course bound up with the question of world population. The population of the world is increasing by nearly 1 per cent. yearly; the present population of about 2,300 million will probably grow to 3,000 million or more by the end of the century. The growth is particularly rapid in Eastern Europe and in Asia. The population of Asia is expected, within fifty years, to reach a figure something like that of the present population of the whole world.

A failure to increase the world supplies of food not only means no improvement in the nutritional

standards of humanity but will mean their deterioration, as more and more mouths will need to be fed. The problem is not only one for ourselves, but for our children and their children.

Many of us are not satisfied with the solutions suggested by the new followers of Malthus, that medical aid such as would lead, for example, to the virtual elimination of killing diseases like malaria should be withheld from countries in which the population is increasing rapidly. Nor is it possible to look forward with equanimity to a new war, atomic or bacteriological, to check the rise in population.

There must, it is clear, be a limit to the earth's capacity to produce food. A probable solution is that, as our experience teaches us, the improved living conditions which will follow improved feeding may result in a decreased birth rate.

International Distribution

Apart from attempting to obtain from the earth the food needed by all its peoples, it is necessary to ensure that each country gets its fair share. This is the more important since countries differ considerably in the extent to which each produces sufficient food for its population. In Britain, for example, we produced about 30 per cent. of our needs before the war and are producing between 35 and 40 per cent. of our needs now.

The degree of Britain's industrialisation can also be seen in the fact that, whereas about 70 per cent. of the world's population is engaged in agriculture, less than 10 per cent. of the British population is so engaged. In order to obtain the high proportion of imported food needed, it is necessary to exchange it, directly or indirectly, for manufactured products or natural resources which are wanted by the food-exporting countries. So long as Britain was a comparatively wealthy industrial country, she was able to do this fairly easily.

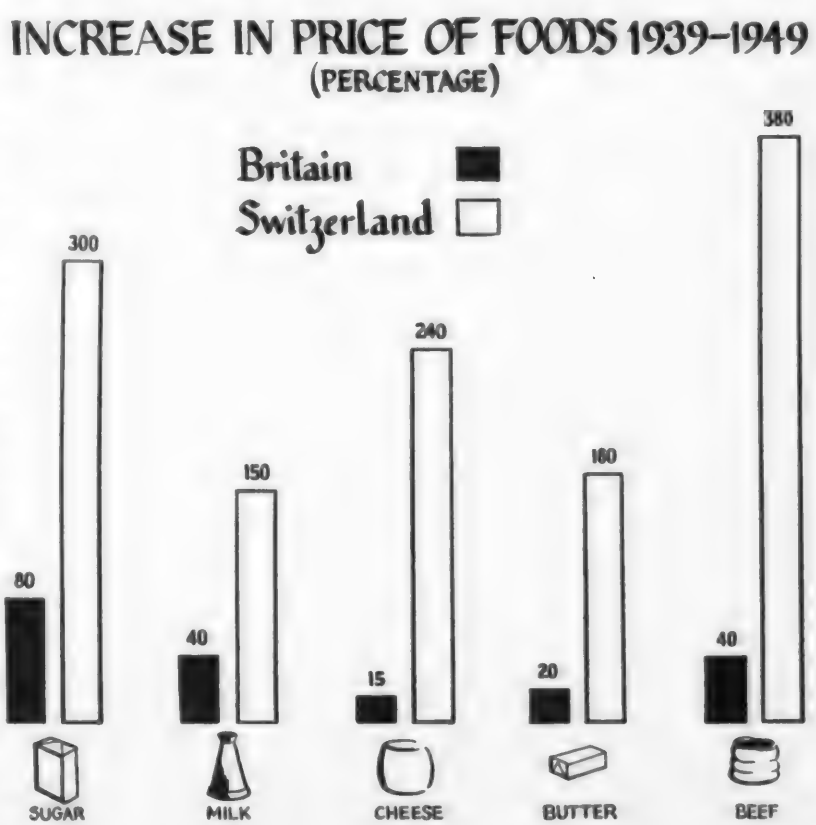
Before the war Britain took an enormous proportion of the supplies exported by all the other countries. Other European countries took much of the remainder of these foods. The extent to which a food-importing country like Britain can buy the foods it needs depends chiefly on three factors: first, the amount of food which is put into the world market; second, the wealth of the importing country; and third, the wealth of other competing importing countries. The amount of food available for export by the food-producing countries such as the United States, Canada, or the Argentine depends on how much they produce, but it also depends on how much they themselves retain for consumption. The amount they produced before the war was often deliberately restricted in order to maintain world prices.

U.S. Wheat Acreages to be Restricted

It is horrifying to learn that it was decided recently by the United States to restrict acreage to be sown next year with wheat by 17 per cent. Apart, however, from the amount produced, the amount of food available for export will also depend on how much is eaten in the producing country. As the standard of living has risen in some of the main food-exporting countries, the consumption by them of many of the more desirable foods has also risen.

Meat consumption has increased appreciably in the United States, Canada, and the Argentine, so that less is available for export. A similar situation can be expected in relation to vegetable oils, used chiefly for making margarine. Africa and Asia, with 60 per cent. of the world's population, and producing the same proportion of the world's vegetable oils, retain only 25 per cent. of what they produce. As their material conditions improve, it can be expected that they will themselves consume more of this food.

The second factor determining the amount of food a country like Britain can import is the wealth of that country. As we have so often been told, wealth means the amount of goods we can produce in the way of natural resources and of manufactured goods. But it is more than that. Not only have we to *produce* the goods but we have also to produce the *goods*.



That is, we have to produce commodities which are wanted by the countries from which we have to import food. With the increasing industrialisation not only of countries like the United States but of countries formerly poorly industrialised, the demand for those commodities which we wish to exchange for food is falling. It is this which is the essence of our exchange problems.

World Food Supplies

Lastly, there are several countries which are anxious to import more food. As we have seen, before the war Britain was by far the largest importer. After five years of war, in which Britain was spending its resources, mostly its capital resources, at the rate of £15 million daily, it cannot be expected to have retained the same favourable position. In other words, other countries which have suffered less material loss than we have are now more able to compete for the limited amount of food on the world's markets. It is true, therefore, that the food supplies of some European countries are, relative to their pre-war supplies, better than those of Britain. But it is also true that our food supplies are still in many respects better than those of most European countries.

It is futile to expect that any alteration of Government, any making or unmaking of plans, any increase or decrease in such policies as bulk buying, can affect the factors that have been discussed. There is simply not enough food produced in the world at present for every country to have all it would like. We in Britain have done very well so far —we cannot expect to recover our former position and certainly not to improve on it without a considerable amount of international co-operation and effort in improving the production and the distribution of food among nations.

Intranational Distribution

However well a country is supplied with food, it cannot be assumed that all the individuals in that country are adequately fed. The United States, for its population, has a greater supply of many important foods such as meat, milk, and fats than most countries. But it is undoubtedly true that there is in the United States a higher proportion of ill-nourished people, even of people with obvious nutritional deficiency, than in Britain. If only one nutritional disease is considered, it will be found that in spite of the energetic steps taken to eradicate it, there were in 1946 about 100,000 people suffering from pellagra, of whom nearly 1,000 died.

Unless there is a superabundance of foods at a price within the reach of even the poorest, it must be expected that the more nutritious, which are also the more expensive—milk, meat, cheese, eggs, fruit, and vegetables—will find their way chiefly to the tables of the wealthier people.

Price Control and Rationing

There is only one way of ensuring that the essential foods are available to all, irrespective of the length of their purse. That way is by a dual system of price control with food subsidies so that the price is held within the reach of all, and rationing so that the better-off cannot take more than their share and leave insufficient for the less well-off.

The alternative of free markets means that the wealthier, buying as much as they wish, will drive up the price until the demand by the less wealthy is reduced so as to be equal to the remaining small supply. The effect of the dual system of price control and rationing can be illustrated by the distribution of milk in Britain.

It is the absence of this system in many European countries today which leaves many of us unthinkingly to suppose that food conditions there are better than here. Shops of course can be filled with meat, butter, eggs, cheese, sugar, if the price of these foods puts them beyond the reach of a large proportion of the people. For example, the Italians are supposed to be better off because they are not rationed for meat. Certainly they would be—if they could afford to pay 8 or 10 shillings a pound for it.

The fallacy of this sort of argument is best seen if we compare this ability to buy as much meat as they like with the average consumption of meat in Italy, which is about one-fifth of that in Britain. These two facts must mean, not that the Italian worker is eating one-fifth as much meat as the British worker, but that, since more than the average is bought by the wealthier people, the ordinary worker must be getting less than the average—less than one-fifth of British rations. If only one-tenth of the Italian population could afford to buy twice what we call our meagre ration of meat, there would be none whatever left over for the rest of the population.

Food Prices Compared

In considering some figures of the comparative costs of food in 1939 and in 1949 in Britain and in Switzerland, countries in which earnings are similar, the increase of the cost in Switzerland compared with the increase of the cost in Britain should be noted. It is surely obvious that without price control and rationing there is a tremendous differential in the consumption of the more sought-after foods, so that while some people are getting quite a lot, some also are getting very little indeed.

It is our system of fair shares in food which, as much as anything else, is responsible for the health of the nation as illustrated by such vital statistics as maternal and infantile mortality. It is this system which has brought to our children the admiration and often the envy of many of our friends abroad.

Conclusions

A consideration of all these facts leads to only one conclusion. So long as world production and international distribution continue as they are, we must continue with a system of rationing and price control. It is the only moral way in which we can try to ensure a full, healthy life for everyone.

The formulation of our will in this matter of food and mankind depends on adequate understanding of what faces us.

The foregoing is an attempt to help in this understanding.

Food from the Commonwealth

PART I

IN reviewing Commonwealth contributions to our diet two methods of approach are possible. We may either consider each member of the Commonwealth in turn in regard to all the foodstuffs which it is able to contribute, or we may consider each foodstuff in turn and assess the supplies which are available from various parts of the Commonwealth. It is clear that while representatives of various members of the Commonwealth will be best qualified to deal with the subject according to the first method, experts having a specialised knowledge of one foodstuff will probably be best qualified to deal with the subject according to the second method. By following both methods, as at the Nutrition Society meeting, we may obtain a valuable symposium of knowledge made available from widely diverse sources.

Food from Canada

According to Colonel J. G. Robertson, Agricultural Counsellor for Canada, the Dominion increased its food production to an astonishing extent during the recent war. Thus in 1944 as many as 7,400,000 hogs were available for slaughter, as against only 3,400,000 in 1938. Cattle marketings increased from 1,100,000 head in 1938 to 2,100,000 head in 1948. Cheddar cheese production increased from 119 million lb. in 1938 to 177 million lb. in 1945, while between 1938 and 1947 the production of eggs increased from 219 to 377 million dozen. Expressed as exports, however, the figures appear even more impressive. While in 1938 Canada exported 160 million lb. of bacon, in 1944 she exported 660 million, an increase of more than 300 per cent.

During the war it proved impossible for Great Britain to pay for all her war expenditure and for the enormous quantities of food which she had to import. With other nations, Canada came to her aid, making gifts of over 2,000 million dollars and interest-free loans of 1,000 million dollars, which together with the conversion of various assets into cash made up about 4,000 million dollars in all. Thus for years, hard-pressed Britain was able to get food from Canada without actual payment. More recently she has been making desperate efforts, with the assistance of Marshall Aid and a line of credit for 1,250 million dollars from Canada, to pay for her purchases of food all over the world.

A worker in a Canadian herring factory washes the herring as they come in from the boats.

Photo National Film Board.

Shortage of dollars and not shortage of Canadian supplies has therefore become the limiting factor. Britain can afford to purchase from Canada only cheese and wheat, of which she has contracted to buy 140 out of the total production of 400 million bushels at 2 dollars per bushel. For her supplies of bacon, ham, eggs, poultry, salmon, and apples, for which Canadian producers need markets giving a fair price, Britain has to turn to soft currency countries, such as Poland, Hungary, Russia, and Denmark. The situation certainly causes resentment among the farmers and fishermen of the Dominion.

New Zealand's Dairy Exports

Dr. C. S. M. Hopkirk, New Zealand Veterinary Officer in London, explained that farming in both islands is based upon pasture. Dairy cattle and sheep are produced in large quantities, but the cereals necessary for pigs are little cultivated. The two limiting factors controlling output are supplies of superphosphate fertiliser and of labour. Exports of food to Britain, however, seem to have been increasing steadily. Thus between 1939 and 1948 butter exports have risen from 115 to 136 thousand tons, cheese from 75 to 83, beef and veal from 55 to 81, mutton from 41 to 69, lamb from 137 to 191, and canned meat from 2·7 to 3·8 thousand tons.

Honey exports, on the other hand, have fallen from 776 tons in 1938 to only 77 tons in 1948, and pig meat from 22,000 tons in 1939 to 9,600 tons in 1948. The importance of these items to Britain may be realised from statistics which indicate that we receive 65 per cent. of our lamb, 77 per cent. of our mutton, 17 per cent. of our beef, 50 per cent. of our butter, and 53 per cent. of our cheese imports from New Zealand.

Britain has concluded a seven-year agreement with New Zealand, of which five years have still to run. Butterfat has at present a guaranteed price of 252s. 6d., and cheese of 141s. 6d. per cwt. Minimum targets have been set for an annual increase of 2 per cent. of dairy produce and an increase of 50,000 tons of meat by the end of the period. Quality will not be sacrificed to quantity

Abstract from the papers read at a conference on "Commonwealth Contributions to the British Diet" held in London by the Nutrition Society on January 28, 1950, under the chairmanship of Dr. W. K. Slater, secretary of the Agricultural Research Council.

Cheeesemakers in one of the many eastern Canadian factories cut the curd after it has coagulated. *Photo National Film Board.*

and, in particular, every effort will be made to maintain the good reputation of New Zealand mutton and lamb.

To obtain improved production, supplies of fertiliser will have to be increased, better strains of grass and clover will be introduced, dairy cows will be artificially inseminated by high-class bulls, and more beef cattle will be used to improve, by their manure, the quality of the pastures normally grazed by sheep. In this connexion climatic conditions must inevitably cause considerable fluctuations in production, and a bad year may well turn an expected increase into a decrease.

Variety from Australia

In addition to staple foodstuffs, such as wheat and flour, meat and meat products, dairy products and eggs, sugar, and preserved fruit, Australia supplies us with a variety of miscellaneous foods, which can be claimed to cover a greater range than those exported to us by any other single country.

Recent figures quoted by Mr. A. H. Heywood indicated that 22 per cent. of our butter imports come from Australia, with 9 per cent. of our cheese, 10 per cent. of our processed milk, 7 per cent. of our eggs, 17 per cent. of our meat, 18 per cent. of our wheat, 21 per cent. of our flour, 28 per cent. of our barley, and 100 per cent. of our imported oats. We receive nearly £1,000,000 worth of fruit cake yearly, and about 8 million Christmas puddings.

Other miscellaneous products include edible tallow, copra, whale oil and other fats, fruit juices, jam, tomato products, and 16 per cent. of our imported wine. A notable addition to Australia's contribution to the British diet comes in the form of gift parcels, of which 11 million arrived between 1940 and 1948. About 3 million of these tokens of Australian goodwill still arrive each year.

Out of this long list, meat is probably the most important single item. From a pre-war annual intake of 109·6 lb., our consumption *per capita* has fallen to only about 70 lb., a decline which occasions some concern to those engaged in the meat trade. While our imports of meat from the Argentine have suffered the most drastic cuts, we are still importing less meat from Australia than in 1938, but there are good prospects of increased meat production in the near future.

The sheep population, which was reduced by 30 million during a series of bad years ending in 1946, is again well over 100 million. Prospects of good supplies of mutton are therefore excellent, except for a reluctance to kill the animals while the wool prices remain so high.

Hopes are perhaps even more sanguine for increased beef production, since vast areas, unsuitable for the production of wool, remain to be developed for cattle in Queensland, the Northern Territory, and the north-west of Western Australia. Shortages of labour and of materials, particularly steel, have still to be overcome.

South Africa's Limited Contribution

Although the Union of South Africa covers a vast area, only relatively small parts are suitable for intensive cultivation. Mr.

Frozen mutton at the Hawkes Bay Farmers' Meat Company, New Zealand.

The Ipswich (Queensland, Australia) factories manufactured more than 13 million pounds of first-grade butter in 1946, much of which was sent to Britain.

A. P. van der Post, Senior Trade Commissioner, described how the Union is divided by a 2,000 miles long escarpment into a series of interior plateaux and a narrow coastal belt. Most of the interior areas are suitable only for sheep grazing, but the coastal areas cover a wide climatic range, and can support dairy farms and the growth of many kinds of crops, including maize, citrus fruits, and sugar cane.

While the production of maize was once sufficient to allow exports to Great Britain, more recently any small surpluses have been used for pigs and poultry. Wheat production is inadequate even for the Union's own demands, and imports are necessary to ensure adequate supplies of bread. The large population of Merino sheep unfortunately yields no mutton suitable for export, since in this breed excellent wool is associated with inferior meat.

The Union can, therefore, make only a limited contribution to our food requirements; this is restricted mainly to articles of food which might be regarded as luxuries, or at least semi-luxuries. During the British winter and early spring, deciduous fruits, such as apricots, peaches, plums, apples, pears, grapes, and pineapples, are available in considerable quantities. Citrus fruits are

An orange grove in the Gamtoos River Valley, South Africa.

supplied between April and November. In 1949 about 2,300,000 cases of oranges were shipped, as compared with nearly 4,000,000 in 1939. About 440,000 cases of grapefruit were also sent, and considerable quantities of lemons and tangerines.

Processed fruits were supplied in the form of jam, marmalade, canned fruit, dried fruit, and fruit pulps and juices. Substantial quantities of wines and brandy were also shipped, and a number of minor products such as tomato purée, chutney, jelly, pulses, and agar-agar.

To these agricultural products must be added the foodstuffs obtained from the oceans surrounding the Union. A modern whaling ship, of German origin, has operated regularly in the Antarctic, and has supplied Britain with considerable amounts of oil. Fish liver oils, valuable for their vitamins A and D contents, are obtained from many varieties of fish. Our opinion of South African canned fish has undoubtedly been prejudiced by early supplies of poor quality snoek but, with greater experience, Union canners should be able to obtain more satisfactory products. Pilchards are in plentiful supply during their season and have already been successfully canned.

Sugar from British West Indies

Although the British Caribbean area contributes bananas, cocoa, citrus fruits, coconuts, tinned fruit juices, and tomatoes to our diet, it was emphasised by Dr. L. F. Wiggins that sugar remains by far its most important contribution. As a by-product of the sugar industry large quantities of molasses are fermented for the production of rum. The desirability of increasing sugar production in the West Indies, and in other parts of the Commonwealth, will readily be appreciated from statistics for 1948, which indicated that of the total British requirement of 2,086,576 tons no less than 1,083,121 tons had to be imported from hard currency areas.

Besides saving dollars, increased purchases of sugar from the West Indies would help to alleviate the chronic economic depression and to provide for the needs of the rapidly expanding population. Good progress has already been made in increasing the total production from about 600,000 tons in 1945-46 to about 800,000 tons in 1948-49. By further improvements, particularly by adopting the Woodford Lodge system of deep cultivation and by combating insects, fungi, and the dangerous mosaic diseases, there should be no difficulty in producing an exportable surplus of over 1,000,000 tons. The West Indian sugar producers, however, have always lived in fear of the dumping of cheap foreign sugar in the United Kingdom, and are seeking a long-term price agreement before committing themselves to greatly increased production.

Any large increase in sugar production will undoubtedly emphasise the important problem of the efficient disposal of by-products. A factory for the production from molasses of yeast suitable for human consumption is already in operation. Another project envisages the recovery of a further 30 per cent. sugar from molasses by the removal of salts with ion-exchange resins. Filterpress mud may be used as a source of natural waxes, which are in short supply and obtainable only from hard currency areas. Bagasse, the cane fibre, is mainly used as a factory fuel, but surplus supplies might be used to make structural board.

(*To be continued*)

BOOKS RECEIVED

Orders for any of the books listed below or reviewed in this issue may be placed with the Books Department,* FOOD MANUFACTURE, *17, Stratford Place, London, W.1. It is regretted that under present conditions it is not always possible to supply books by return of post.

Mushroom Growing Today. By F. C. Atkins. Pp. 187. Faber and Faber, London. Price 12s. 6d. net.

The History of Sugar. Vols. I and II. By Noel Deerr, F.C.G.I., F.R.I.C. Pp. 258+xiv and pp. 636+xiv. Chapman and Hall, London. Price £5 5s. the set.

Maple Syrup Research

A PROCESS for strengthening the natural flavour of maple syrup, worked out by scientists of the Bureau of Agricultural and Industrial Chemistry's Eastern Regional Research Laboratory in Philadelphia, as a Research and Marketing Act project, promises to expand outlets for a better quality product and will provide consumers with improved maple products at lower costs.

Maple syrup blends, containing 75 to 80 per cent. cane-sugar syrup, are inexpensive and have a large market, but they are made chiefly from grades of maple syrup that have a dark colour and very strong flavour. The light-coloured, delicately flavoured, best grades cannot withstand the dilution necessary in producing an economical blend.

The problem, according to Dr. G. E. Hilbert, chief of the Bureau, is that the darker grades normally contain caramel and other non-maple flavours that carry over into the blends, and it has been found that by heating maple syrup for two hours at a temperature of 250° F., a dark syrup with four to six times stronger flavour than the original product can be made.

The heating is done at atmospheric pressure and the water lost by evaporation is restored after heating is completed. The equipment used is designed to hold this moisture loss to a minimum. Although the characteristic maple flavour is intensified by the process, little or no non-maple flavour is developed. The cost of the treatment—which can be used with all grades of syrup—is negligible.

Strengthened and darkened maple syrup can be diluted with cane-sugar syrup to make a full-flavoured maple syrup blend that is practically indistinguishable in taste and appearance from the best grades of pure syrup, although it costs much less. Bureau scientists in Philadelphia are now investigating the use of strengthened syrup to give natural maple flavour to ice cream, bakery products, and other foods.

The Use of Dulcin in Foods and Beverages

L. M. SPALTON, B.Pharm. (London), M.P.S.

The properties and uses of dulcin and the data necessary for its incorporation in foods and beverages are discussed in this article.

IN 1879, an American chemist named Fahlberg noticed that his bread tasted sweet when he was eating his supper. He traced this sweetness to his hands, and thence to a substance *o*-sulphobenzimide, or saccharin, which he and his colleague, Remsen, had prepared. In 1883, Berlinerblau discovered that *p*-phenetyl urea, or dulcin, also possessed a powerful sweet taste. Since then, many other substances that are very much sweeter than sugar have been isolated. One of these is *n*-propoxy-2-amino-4-nitrobenzene, which is about 4,000 times as sweet as cane sugar.

Dulcin's Sweetening Powers

Until 1940, saccharin remained the only synthetic sweetening substance which was employed in food manufacture in Great Britain, but in that year dulcin began to be manufactured in considerable quantity and, except for a break in production during the latter part of the war, has remained available as a commercial product.

The taste of dulcin is softer to the palate than that of saccharin, and this is believed to be due to the fact that dulcin stimulates the sweet taste buds only, whereas saccharin excites both the sweet and bitter taste buds. The effect of saccharin on the latter is more persistent, thereby producing a slightly bitter after-taste which is characteristic. On the other hand, dulcin has several limitations. Its sweetening power is considerably less than that of saccharin, and it has not the advantage of high solubility in water. On the basis of sweetening power, dulcin is rather more than twice as costly to use as saccharin, but slightly cheaper than sugar. As will be explained later, it is possible to benefit by the more neutral taste of dulcin, without appreciably increasing manufacturing costs, by taking advantage of the great increase in sweetening power which is found with blends of saccharin and dulcin. In common with saccharin, it is a synthetic sweetening substance which lacks the food value of sucrose and other sugars.

Properties of Dulcin

Chemically dulcin is *p*-phenetyl urea. Since structurally it bears no resemblance to saccharin, it is to be expected that its properties should be quite different. Dulcin is an unusual substance in that for practical purposes it is almost insoluble in cold water. One part of dulcin will dissolve rapidly in about 50 parts of hot or boiling water, but if this concentrated solution is allowed to cool, some of the dulcin will crystallise out. If, however, the hot solution is poured into an excess of cold water, a stable solution at room temperature is produced. Even then, it is impossible to prepare an aqueous solution of dulcin which is more concentrated than about 1 part in 800 in the cold, although for most purposes a weaker solution than this is quite adequate.

Solubility in Various Solvents

The solubility of dulcin is not appreciably affected by the addition of sodium bicarbonate, ammonia, or by acids such as acetic acid. It is soluble in some other solvents, and particulars are given in Table I.

TABLE I

SOLUBILITY OF DULCIN IN VARIOUS SOLVENTS AT 20° C.

	Per cent.	
Carbitol	13·5	w/w
Ethyl alcohol 90 per cent.	3·7	w/v
Ethyl alcohol 20 per cent.	0·2	w/v
Glycerin	0·94	w/w
Isopropyl alcohol (A.R.)	1·3	w/v
Isopropyl alcohol 45 per cent. ..	0·6	w/v
Propylene glycol ..	4·8	w/w
Triacetin	1·0	w/v

Sweetening Power

Within the limits of error which are inherent in organoleptic tests, the sweetening power of dulcin varies with the concentration and *p*H of the solution; the presence of other substances also has its effect. Similar variations are experienced with saccharin. The sweetening power of dulcin is normally expressed as 250 times that of sugar, but in certain circumstances it may be more than this. When the solution also contains a proportion of sugar the sweetening power may be increased to between 300 and 350 times that of sugar, according to the concentration, and other factors.

This synergistic effect of two sweetening substances is even more marked in mixtures of saccharin and dulcin. The sweetness of such a mixture is considerably greater than the sum of the individual sweetnesses of the substances present. Thus 1 oz. of a blend of $\frac{1}{2}$ oz. of saccharin and $\frac{1}{2}$ oz. of dulcin would have a theoretical sweetening power on the basis of saccharin at 550 and dulcin at 250, equivalent to 23 lb. of sugar, but in practice 1 oz. of such a mixture is equivalent to 36 lb. of sugar. (See Fig. I.)

Physiological Effects

In common with saccharin, considerable work on the toxicity of dulcin has been done. Animal tests carried out over long periods under closely controlled conditions have failed to reveal any undesirable physiological effect from dulcin in normal usage. Dulcin has now been fairly extensively employed for sweetening beverages and foods, and it is generally considered quite harmless, but having no food value.

Recent work in the United States, however, suggests that dulcin may cause injury to rats, when fed to them for two years.

Dulcin, particularly during the continued sugar shortage, can be

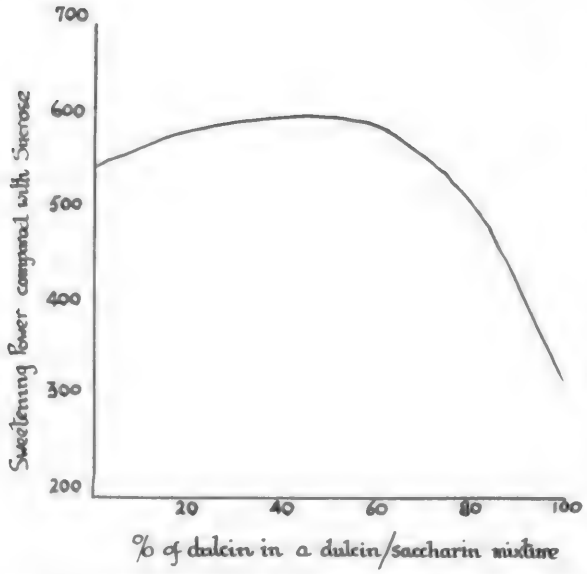


Fig. 1. Sweetening power of dulcin/saccharin mixtures in the presence of sugar and citric acid. The concentration of the mixture was 1 oz. to 10 gal. of water and each 10 gal. batch also contained 20 lb. of sugar and 12 oz. of citric acid.

a useful sweetening agent for incorporation in foods. It must be emphasised that although dulcin has a more bland taste than saccharin, it will not impart "body" to a product. Also, if there is a proportion of citric acid present, as for instance in table delicacies, it does not mask the acidity of the product in the same way as sugar. Thus it is that synthetic sweeteners should be used in conjunction with a considerable proportion of sugar, and not alone.

Soft Drinks, Flavourings, and Cider

The soft drinks industry has always been a big user of saccharin, and now also employs substantial quantities of dulcin. A bottling syrup of 45° Brix might contain 13 oz. of dulcin, 300 lb. of sugar to 100 gal. of syrup, or 3 oz. of saccharin, 4 oz. of dulcin, 300 lb. of sugar to 100 gal. of syrup. A concentrated cordial equivalent to a sugar sweetness of 4 lb. per gal. could contain 5 oz. of dulcin, 300 lb. of sugar, water to 100 gal. of syrup, or 1¾ oz. of dulcin, ¾ oz. of saccharin, 300 lb. of sugar, water to 100 gal. of syrup.

Beverages sweetened with dulcin and sugar possess a better taste than those containing a proportion of saccharin, but for economic reasons a blend of saccharin, dulcin, and sugar is frequently employed. Fig. 1 indicates the approximate sweetnesses of various saccharin / dulcin mixtures in the presence of sugar and citric acid. A blend of 60 per cent. dulcin and 40 per cent. saccharin shows a material increase in sweetening power over dulcin alone, and since the amount of saccharin included is relatively small, the bitter aftertaste is not appreciable. By employing blends containing more saccharin and less dulcin, it is possible to reduce the manufacturing cost of the product, but as the saccharin content increases, the taste becomes rougher. Less sugar can be used in the above formulae, down to the minimum specified in the 1949 Amendment to the Soft Drinks Order, but a high sugar content is advantageous on taste grounds as well as for nutritional reasons.

Methods of Incorporation

The method of incorporating dulcin in soft drinks is to dissolve the weighed quantity of the powder in hot or boiling water at the rate of 1 oz. to ½ gal. The hot concentrated solution is then poured into the cold syrup. Provided that the concentration of dulcin in the cold mix does not exceed 1 oz. in 5 gal.—that is, the maximum solubility of dulcin in cold water—then a satisfactory and stable product will result. If the sugar syrup is hot processed, the dulcin may be added to the boiling water in the hot process mixing tank and dissolved before the sugar is added. When the sugar is dissolved, the syrup is allowed to cool in the usual way. In both methods saccharin and citric acid should be added after the incorporation of dulcin. A cold solution of dulcin cannot be stronger than 1 oz. to 5 gal.; it is therefore not convenient to prepare a stock solution (as is customary with saccharin in most syrup rooms) because of the large bulk involved.

Fruits and Vegetables

According to W. B. Adam, of the Campden Research Station,[1] dulcin gives good results for sweetening canned beans in tomato sauce. The apparent sweetness of dulcin in a syrup of 30° Brix is about 300 times that of sucrose. The addition of dulcin does not appear to increase the rate of corrosion in the can. In canned fruits dulcin may be used, if desired, to increase the sweetness above that given by the statutory quantity of sugar, but it is not permissible to replace the required quantity of sugar by a proportion of dulcin. Similar remarks apply to canned vegetables. If dulcin is used in such circumstances, its presence as an ingredient must be declared on the label.

Sweetening Bottled Fruits

For sweetening bottled fruits, dulcin should be used either alone or in conjunction with saccharin or sugar. It possesses an advantage over sugar: the specific gravity of the solution is not increased and the tendency for the fruit to float to the top of the bottle is not so marked. A satisfactory syrup equivalent to a sweetness of 15° Brix can be prepared by dissolving 8 oz. of dulcin in 100 gal. of water. Syrups of greater sweetness than this can be prepared with dulcin, but as the dulcin content is increased, the artificiality of the flavour begins to be perceptible.

As with soft drinks, the inclusion of a proportion of sugar with dulcin will vastly improve the flavour of the final product.

The method of incorporating dulcin resembles that employed for soft drinks. The powder is dissolved in hot or boiling water and poured on to the fruit in the usual way. Alternatively, tablets of the required quantity of dulcin might be introduced into each container before the bottling process.

Dulcin shows considerable stability at boiling temperatures, although there may be some slight loss of sweetening power if subjected to these for long periods.

Sauces, Pickles, and Chutneys

Dulcin can be incorporated in sauces, pickles, and chutneys, as an alternative to sugar, by dissolving it in the hot ingredients. Boiling with acids as strong as 5 per cent. acetic acid for one hour is not likely to cause any significant loss of sweetening power. The presence of dulcin should be stated on labels, although this is not obligatory for thick mixed sauce of the type commonly used with meat or fish, Worcester sauce, and similar thin vinegar sauces, and salad cream.

Jellies and Jelly Products

A recent Ministry of Food order specifies a minimum sugar content of 63 per cent. in table jellies. These may be sweetened further if desired by the addition of dulcin, but the required percentage of sugar must be included in such products. The order does not include sweetened dessert gelatin products which may be sweetened with saccharin or dulcin. When formulating dessert gelatin products, it is customary to work on the sweetening power of dulcin as 1 : 250 sugar, or less. Unless there is a proportion of sugar also present in the final product, it is advisable to reduce the citric acid content, since dulcin does not mask the acidity in the same way as sugar. Dulcin may be incorporated in such products by mixing in dry, or better, by spraying a solution of dulcin in a suitable solvent on to the gelatin crystals placed in a tray. Dessert gelatin products containing dulcin should include a mention of dulcin in the ingredients, and the words "sweetened with dulcin" or "partly sweetened with dulcin" should appear prominently.

Other Food Products

Dulcin may be mixed in dry to sweeten various cake and pudding mixtures. It is required that the presence of dulcin should be declared prominently on the label.

It may be used as a sweetening agent for diabetic confectionery. The following composition[2] has been suggested for a diabetic chocolate:

90 lb. of neatwork, 13 lb. of cornflour, and 14 lb. of milk powder are worked in a melangeur for 72 hours, after which the mixture is refined twice and conched for a further 72 hours with 4 oz. of dulcin, 1 oz. of vanillin, and 6 lb. of cocoa butter. After the conching the chocolate is tempered and moulded. The chocolate is of low carbohydrate content, and is stated to have a fairly pleasant taste.

Dulcin has been used for sweetening various other food products, including such things as coffee essences, macaroni, and chocolate couverture. In considering the use of dulcin in other products, a decision on suitability and method of incorporation can be arrived at by a study of its properties followed by laboratory tests.

REFERENCES

[1] W. B. Adam, *Annual Report of the Fruit and Vegetable Preservation Research Station, Campden*, 1940, 15-32.

[2] G. M. Dyson, *Soft Drinks Trade Journal*, 1949. **4**, p. 224.

Dipping Fish Fillets or Steaks

An apparatus developed by the Pacific Fisheries Experimental Station may replace the noticeably cumbersome, uneconomical, and costly equipment in use by the industry for the purpose of dipping fish fillets or steaks. Compact, easily cleaned, inexpensive to operate, and economical in its use of dipping solutions (such as ascorbic acid as an antioxidant), the apparatus may also offer possibilities for glazing frozen fish.

The device consists of a half-circular tank set in a framework of pipe. A double wheel, less the rims, supports scoops or trays, which pivot freely from the ends of the spokes, and fish fillets are loaded on the bottom side of the perforated scoops. The rotation of the axle lowers the fillet-laden scoops into the dipping solution, the fillets slide off the scoop and are picked up by the top side of the following scoop. A trip tips the scoop in such a way that the fillet is deposited on a draining screen or on a combination of draining screen and conveyor. A catch bar holds the scoop in position as it reapproaches the loading position. Speed of rotation of the rimless wheel is controlled by a suitable mechanism and determines the length of the dip. Blunt rakers fitted on the ends of the scoops prevent injury to the fillets as they are raised from the solution. A self-levelling device maintains the volume of dipping liquid in the tank from a reservoir of prepared solution.

Fruit Juice Production

Shortly before the war, Dr. V. L. S. Charley and Dr. T. H. J. Harrison prepared a work entitled "Fruit Juices and Related Products (Tech. Comm. No. 11, June, 1939). This bulletin went out of print some years ago, and requests to the Commonwealth Bureau of Horticulture and Plantation Crops that this should be reprinted have resulted in the publication of a new work* which, under the editorship of Dr. Charley, who has gathered together the wisdom of a team of experts, surveys recent progress in this industry.

In a foreword, the Rt. Hon. Viscount Bledisloe welcomes this book, as will all concerned in the fruit juice industry, which brings up to date information on production and preservation methods.

Experts have collaborated in setting out in detail the latest discoveries, particularly those relating to methods of deaeration and clarification, concentration, retention of vitamins, the fortification of juices with these accessory food factors, and the function and uses of enzymes in modern juice production.

Fully illustrated throughout and with abundant references to the literature, this book will acquaint the reader with world-wide developments, and will provide him with a comprehensive survey of the industry as it stands today.

* *Recent Advances in Fruit Juice Production*. Edited by V. L. S. Charley, B.Sc., Ph.D. Pp. 176. Commonwealth Bureau of Horticulture and Plantation Crops. Price 15s. net.

The Determination of Moisture in Organic Substances

Part III

C. F. M. FRYD, B.Sc., A.R.C.S., A.R.I.C.

The technique of examining timber and similar materials for moisture content by means of a "megger" or resistance meter, having electrodes in the form of fixed needles accurately spaced, is not novel, but during and since the war, moisture meters, having an electrical basis, have been considerably extended and developed. Their virtues are obvious in that they are capable of giving a value for a moisture component instantaneously, and even, under favourable circumstances, continuously on material passing a certain point on, say, a belt conveyor. For such purposes their advantages are so marked that the lack of precision or specificity which occasionally affects the results obtained may be discounted. It is necessary, however, to give some attention to the possible sources of inaccuracy in such devices.

ONE of the simplest electrical moisture meters consists of a resistance meter based fundamentally on the Wheatstone Bridge. The assumption is made that for every material there will exist an approximately constant pattern of cellular macroscopic structure, and that the chemical nature of the material will approximate sufficiently closely to that of the sample on which the calibration was carried out.

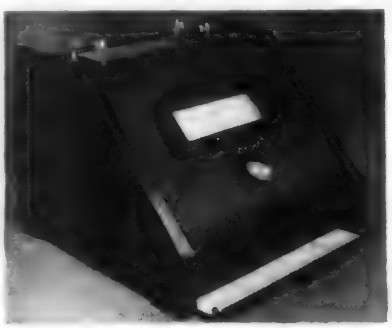
If these assumptions are justified, it is most probable that the relation between specific conductance and moisture content will be of the same form in sample material and calibration material; but although in such apparatus the precaution is customarily taken of using such pressures on the sample between the electrodes that no major voids or gaps can exist, the possibility of the device functioning as a pressure-variable resistance is obviously present.

Development of Moisture Meters

In certain plant materials the alternative danger of some natural channel such as a rib or vein happening to coincide with the path of the current and substantially reducing the average resistance must not be overlooked.

It was perhaps with the idea of avoiding difficulties of this sort that the moisture meters based on capacity changes were introduced. In such a device the sample may be placed between electrodes, possibly in a container, which may be of transparent plastic, and it then forms the dielectric of a previously balanced capacity. The unbalance thus introduced is measured, often by the determination of the change needed to restore the *status quo*, the amount of the change being calibrated both against the particular material and on its moisture content.

An advantage is the large quantity of sample which may thus be dealt with, permitting the determination of moisture if desired in as much as a small bale of organic material. An obvious disadvantage is the error which might creep into such a system through the presence of small amounts of contaminants strategically placed, *e.g.* metal particles, freshly condensed moisture still in the form of a surface film, and the like. In contradistinction to the resistance meter, devices of this type usually require that a defined weight of the sample shall be used.



This moisture meter depends for its action on the measurement of changes in capacity owing to the presence of moisture.
Photo Toplis, Simpson, and Co.

Some moisture meters (that introduced by the N.P.L.[26] and now marketed by various manufacturers is an example) utilise both resistance and capacity in one automatic device, which expresses the combined result as a current reading. The device converts both the resistance component and the capacity component into a phase-change in an alternating current, which itself is expressed as a direct current. The principle then is that the additional resistance introduced by unwanted voids in the material of the sample is compensated for by a simultaneous reduction in the increased capacity caused by the presence of the sample. Thus in such a device both weighing the sample and high pressure on the portion between electrodes may be dispensed with.

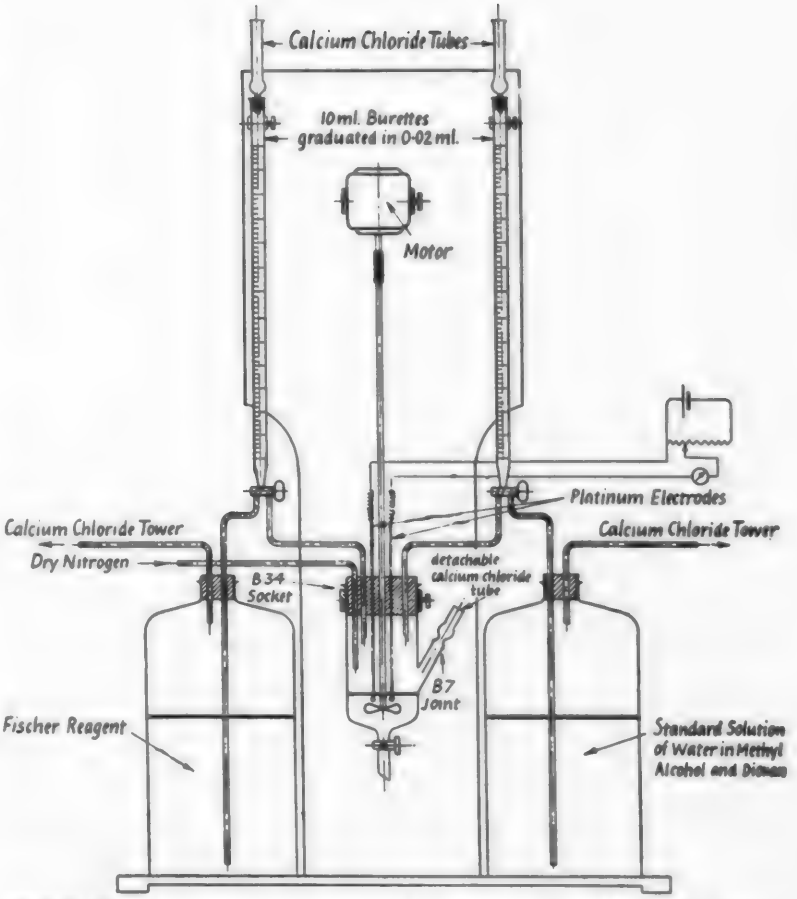
Moisture Content of Dried Egg

The author used such a device for many tens of thousands of examinations of the moisture content of dried egg during the war and the immediately post-war years.[27] It was found that for powdered materials a considerable increase in precision was produced if "standard height of fall" was brought about by the introduction of a suitable grill at a fixed height above the receiver cup of the apparatus. For many organic powdered materials there is a size of mesh such that the material will just not fall through it until vibration is applied to the mesh. (In the case of dried egg an appropriate size of mesh is 10 mm. square.) When a sample is placed on a grill of such mesh it remains until vibration is applied, and

each particle falls then from substantially the same height. The consequent uniformity of packing density was found to cause an increase in precision, which well repaid the slight additional expenditure of time.

Pouncy and Summers[8] pointed out in 1939 the difficulty which may arise when an attempt is made to determine available moisture in confectionery and similar products. Sugar, protein, and starchy products are present in high concentration, and estimations of the refractive index, especially, are rendered difficult. Moreover, quite small quantities of materials are sometimes available, and results are frequently needed quickly; in fact, speed is decidedly of more importance than precision, for it is usually if not always the case that the information required concerning confectionery samples is of the "threshold" type. Pouncy and Summers developed a method which has the advantage of requiring only minute amounts of material, of being very rapid, and of placing the sample easily and definitely into one of a number of narrow ranges of moisture content.

The principle underlying their test is that a crystal of a normal substance will deliquesce if the atmosphere in which it is placed has a relative humidity above a certain limit. This limiting humidity is that produced by a saturated solution of the crystal in question at the same temperature, a figure which may easily be determined.



Apparatus for the determination of water with the Fischer reagent. (After T. G. Bonner, *Analyst*, 1946, **71**, 483.)

Relative Humidity and Water Content

Similarly, the relative humidity of the atmosphere above a sample of otherwise constant chemical composition bears a relation to its water content. Thus by the behaviour of a series of suitably graded microcrystals, it is possible to determine into which of a series of moisture content ranges the sample may be placed.

In applying this principle to the actual determination of moisture in sugar confectionery, crystals of the indicator substances about the size of a small pin's head are used. If the sample is of firm consistency, a slice 5 mm. in thickness is placed on a clean microscope slide after a circular hole 5 mm. in diameter has been bored through it. On the clean glass base of the pit so produced is deposited the miniature crystal, covering the top of the system with a slightly greased slide. The whole is then maintained at a fixed temperature for one hour, when the deposited crystal is examined under the low power objective of a microscope. If the humidity is above the limit for the particular crystal, the latter will, at the expiry of the time, be seen as a small island surrounded by liquid. If the sample material is semi-liquid or plastic it may with care be piped or smeared to form similar pits, and obviously an appropriate range of crystals may, each in its own pit, be used simultaneously. The method has also been found of service in obtaining approximate values for the moisture content of timber without the use of complicated apparatus.

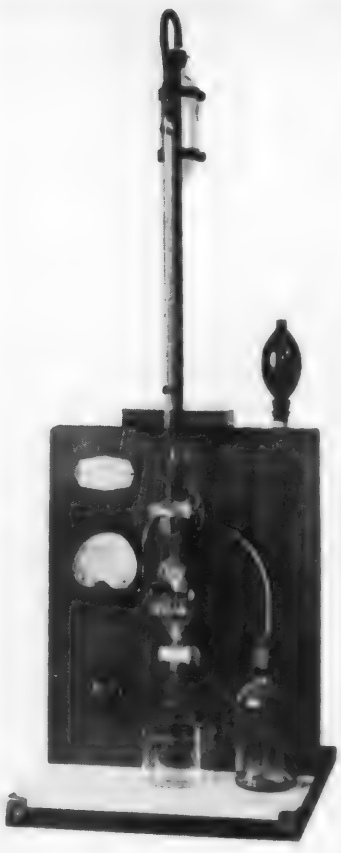
TABLE V

RELATIVE HUMIDITY AT WHICH DELIQUESCENCE OCCURS AT 20° C.

	Salt	*Relative Humidity*
1.	Potassium acetate ..	20·0
2.	Magnesium chloride ..	33·0
3.	Potassium nitrite ..	45·0
4.	Ammonium nitrate ..	63·0
5.	Sodium nitrite	66·0
6.	Sodium chloride ..	75·0
7.	Ammonium chloride ..	79·2
8.	Ammonium sulphate ..	81·0
9.	Potassium bromide ..	84·0
10.	Potassium chromate ..	88·0
11.	Sodium sulphate ..	93·0
12.	Sodium sulphite ..	95·0
13.	Lead nitrate	98·0

The Karl Fischer Method

In 1935, Karl Fischer, while estimating water in sulphur dioxide, discovered the reagent which has since been associated with his name; in its simplest form it consists of iodine and sulphur dioxide, dissolved in an inert liquid. In the presence of water the following reaction occurs:



A new Karl Fischer apparatus.
Photo Townson and Mercer.

$$I_2 + SO_2 + 2H_2O = 2HI + H_2SO_4$$

Unfortunately the reaction is reversed in acid conditions, and thus the endpoint is affected by the products of reaction. To avoid this difficulty Fischer introduced pyridine into the system, with the dual purpose of neutralising the acid radicals produced and at the same time of forming a loose compound with the sulphur dioxide, thereby reducing its vapour pressure. He suggested that the reaction might be expressed:

$$I_2 + 2H_2O + (C_5H_5N)_2SO_2 + 2C_5H_5N = (C_5H_5N)_2H_2SO_4 + 2C_5H_5N.HI$$

With a reagent containing these three ingredients dissolved in an inert solvent, Fischer titrated solutions containing water until the appearance of a bright orange-brown colour showed that the iodine was no longer being reduced. His original reagent contained:

	g.
Pyridine	790
Sulphur dioxide ...	192
Iodine	254

These were dissolved in an anhydrous solvent and this reagent was calculated to be equivalent to 7·2 mg. of water per ml. of reagent. It should be noted that the molecular proportions are ten, three, and one respectively, *i.e.* that considerable excesses of pyridine and sulphur dioxide are present.

Solution must be Standardised

Unfortunately it appeared that the reaction did not, in fact, take the course indicated. Results depended on the nature of the solvent and on the manner in which the titration was carried out; in any case, the reagent was found to be equivalent to less water than was calculated. The introduction of methanol in excess of a minimum proportion was found to be a stabilising influence; but even with this addition no pretence could be made that the reaction shown above or any similar one took place stoichometrically. It became the practice to standardise the solution immediately before use, usually against a prepared water-in-methanol mixture.

Producing the Fischer Reagent

A number of methods of producing the Fischer reagent are in the literature; in the main they prescribe two stock solutions, one of iodine in methanol, sometimes with pyridine in addition, and the other of sulphur dioxide in pyridine. The final concentrations of the mixture, however produced, are of the following order:

	mol.
Pyridine ...	10·0
Sulphur dioxide	3·0
Methanol ...	2·5
Iodine	1·0

Certain undesired side-reactions occur when the solution is freshly mixed, which result in a continuous and at first rapid decrease in the water equivalent; for this reason it is customary to prepare the mixed reagent a few days before its intended use. This aged reagent is standardised against a water-in-methanol solution of known composition. Since the reagent may absorb water from the atmosphere, and in any case continues to undergo a slow degradation, it should be restandardised at regular and fairly frequent intervals.

It is apparent that in order that moisture should be titrated with this reagent the water must be present in a liquid phase; and moreover, since the water-equivalent of the reagent as normally made up is of the order of 5 mg. per ml., it is also desirable that the total water to be determined should not exceed 0·1 to 0·2 g. For substances other than clear and inert liquids containing small proportions of water, therefore, it is customary to extract the water either with methanol or with an

The Gregory hygrometer by which an almost instantaneous reading of the relative humidity may be shown on a scale or recorded on a chart.
Photo Negretti and Zambra.

inert hydrocarbon, and if necessary to take an aliquot.

Visual Titration

The endpoint may be visible (colourless or pale yellow to orange-brown), and where the water to be titrated is presented in the form of a clear solution in methanol this is undoubtedly the preferred method. The titration, which is extremely sensitive to atmospheric moisture, is customarily carried out in a closed system, and commercial apparatus providing for this is available. In some cases a back-titration method is recommended, using standard water-in-methanol solution for the titration of the excess Fischer reagent. It is argued that the change from deep brown to the yellow of the spent reagent is more obvious than the sudden increase of colour which terminates the gradual darkening of an originally colourless solution.

Electrometric Titration

Where the substance in which water is to be determined is itself coloured, or is a fine powder, it may not be possible to present its water component in the form of a clear and colourless solution in the inert solvent. In such cases certain methods of electrometric titration are available, of which that known as the dead-stop back-titration method is well known and of considerable value.

The basis of the method is simple. Between two electrodes of the same metal (platinum), immersed in the solution to be titrated, a slight E.M.F. is maintained, sufficient normally to cause polarisation on one or both electrodes. Since this is a back-titration method the liquid will contain both spent and fresh Fischer reagent, *i.e.* both the iodide and the iodine ions will be present. These ions, acting respectively and yet compatibly as reducing and oxidising agents, depolarise the electrodes, and current passes. This condition persists until, during the operation of back-titrating with water solution, all the iodine ions are removed from the system. Polarisation of the cathode then occurs, and the current ceases.

The method has the advantage that very small potential differences (10 to 20 millivolts) and currents (at most a few hundred micro-amps) are involved, and that the endpoint is shown by a null reading. Thus any electrolysis effect is infinitesimal and any current amplification system, without reference to whether it is linear or not, may be used if desired. Certain commercial apparatus utilises "magic eye" and other special devices for indicating the null point in place of a micro-ammeter. A disadvantage of this method is the time-lag (2 to 5 seconds) required for polarisation to take place, necessitating slow addition of the back-titrating reagent.

A moisture meter, based on the M.P.L. specification, in which changes in both resistance and capacity are combined into one reading, which is correlated with moisture content.

Photo Toplis, Simpson, and Co.

Direct Titration

A similar direct titration procedure may be substituted; in this case the endpoint is shown by the sudden surge of current as the first appearance of excess of iodine depolarises the cathode. The anode will already have been depolarised by the iodide ions produced by the reaction of the water with the Fischer reagent, and thus the resistance of the system will fall suddenly from a few thousand to a few hundred ohms. The endpoint is preceded in this method by useful indicating surges of current as local excesses of iodine accumulate near the electrodes.

Preparation of the Sample

As has been stated, with the aid of the Fischer technique the determination of moisture almost to any desired degree of accuracy is possible, provided that the moisture either occurs in a liquid, which is substantially inert to the ingredients of the reagent, or can without decomposition be wholly extracted into such a liquid. For instance, water present to the extent of a few parts per hundred thousand in saturated aliphatic hydrocarbons or certain vegetable oils is readily determined by such means.

From other fats and oils, and from unsaturated hydrocarbons, it is usually necessary to extract the water with anhydrous methanol or decalin (decahydronaphthalene). In the case of solid organic materials and foodstuffs of mixed composition, extraction is almost invariably necessary, and a prolonged time of contact is often required.

Overcoming the Time Factor

Where such prolonged extraction is a necessary preliminary step, it is clear that the Fischer procedure has lost one of its main advantages, *i.e.* the speed with which an accurate moisture determination may be made. To overcome this difficulty various workers[28, 29] have developed procedures in which the sample is extracted at high speeds in a Waring Blendor or similar device in the presence of a known volume of extracting liquid. A more serious objection to the use of the Karl Fischer technique is presented when the possibility occurs of the extracted liquid containing substances which reduce iodine, such as aldehydes, ascorbic acid, and the like. For this reason determinations of moisture on substances of unknown composition should be treated cautiously.

(*Continued on page* 380)

Monosodium Glutamate

ITS MANUFACTURE AND USES

PART II

MONOSODIUM GLUTAMATE is a white crystalline salt having a characteristic flavour, which, however, is not predominant when added to food products in the small quantities required. It has the peculiar property of intensifying the flavour of substances to which it is added by sensitising the flavour buds of the mouth, and inducing the flow of saliva when it is present. It is also claimed for it that it is capable of suppressing undesirable flavours, but this must be when these are not too apparent.

Oriental Origin

While the interesting flavour-building properties of glutamate have not been recognised until recent years, this is true only as regards the comparatively pure isolated substance. It is probable that the contribution of a glutamate to the building up of food flavours dates back to the discovery of the processes used in the Orient to convert soya beans into soya sauce. The slow conversion of the soya bean meal portion of the basic materials used for soya sauce preparation is, in part, owing to the action of vegetable enzymes and the resulting splitting off of various amino acids, particularly glutamic, soya bean meal containing approximately 20 per cent. of glutamic acid. Enzymatic hydrolysis usually results in the formation of ammonia from acid amides, and Oriental soya sauce has been found to contain ammonium complexes of amino acids, including ammonium glutamate. Ammonium glutamate undoubtedly plays a part in building up the flavours associated with soya sauce, and it is of interest that from the time monosodium glutamate became commercially available it has been customary in the Orient to use it as a flavour reinforcement in soya sauces.

Development of Processes

The story of the development of processes for the production of glutamic acid and glutamates is a long one. In the United States in 1936, wheat gluten had become the standard raw material, with hydrochloric acid as the hydrolytic agent. Raw materials other than wheat gluten began to be experimented with, and patents were obtained by nationals of many countries on the processing of practically every available protein known to contain recoverable amounts of glutamic acid.

The Steffens Process

Molasses is normally desugared by what is known as the Steffens process. In this process the molasses is diluted with water to about 5 or 6 per cent. sugar, and is then treated in freshly burned and ground lime. The calcium oxide combines with sugar to form calcium saccharate, which is relatively insoluble and is removed by filtration and returned to the sugar process. The filtrate from the filter press is commercially known as Steffens waste water, and contains approximately 2½ per cent. solids. When concentrated to 60 or 70 per cent. solids it keeps for a long time.

In the production of glutamic acid from this source, the Steffens filtrate is first carbonated with limekiln gasses. The calcium carbonate thus formed is removed by settling and filtration, and the clarified weak filtrate is then concentrated in large multiple effect evaporators. The concentrate is finally conveyed in large tankers to the glutamate factories.

During the 1914-1918 war, the Steffens waste water was utilised for the production of potash, but when peace was declared there was a sudden end of this business. Work was started with the object of producing betaine and amino acids, and after what sometimes looked like insuperable difficulties had been overcome, 70,000 pounds of glutamic acid were produced during 1928. Such was the subsequent progress that in one plant the daily production exceeds 9,000 pounds of monosodium glutamate.

Glutamic acid occurs in three forms, the active (natural) L-form, the inactive E-form, and the racemic mixture of the two modifications. Only the active form occurs naturally, and is that made commercially. It is its monosodium salt which has the unique power of flavour enhancement when added to foods.

Does Glutamate Possess Meat Flavour?

Studies have been made to establish the existence or otherwise of the meaty flavour of glutamate. It was concluded that the characteristic "meaty" flavour of beef is derived from the meat fibre rather than from the juice, that it consists almost entirely of odour, and that chemically it is a mixture of hydrogen sulphide with various acids and amines split from the amino acids of the protein.

Amino acids in general, as well as their sodium salts and their hydrochlorides, are without odour. Monosodium glutamate appears to be entirely without odour when pure. Its taste has all four components: sweetness, sourness, saltiness, and bitterness. In addition, glutamate has the capacity of stimulating the feeling nerves of mouth and throat to produce the sensation describable as "satisfaction."

It is concluded that since the meat flavour is predominantly odour, and pure sodium glutamate is odourless, meaty flavour cannot be due to monosodium glutamate. The origin of the meaty association has been traced back to the crude glutamates formerly avail-

able, which had odour owing to protein decomposition products.

Results of Taste Tests

Studies of the tastes of other amino acids have been carried out. Most of the amino acids, unlike the doubly acid glutamic, hydroxy-glutamic, and aspartic acid, gave solutions that were chemically neutral or nearly so. Where this was the case, the acid itself was used; where not, its sodium salt. The three amino acids found to taste conspicuously sweet were glycerin, alanine, and hydroxyproline. Nearly every other one tested, including methionine, was weakly to moderately sweet.

Sweetness of taste appears to be a characteristic of amino acids. No saltiness was noted except with the sodium salts of L(+) glutamic acid. Sourness was found to be rare and to characterise, for the most part, only the dicarboxy acids and the hydrochlorides. Many amino acids were found to be bitter, though none was strongly so. Bitterness in slight degree may therefore be considered as characteristic of amino acid. The sodium salts of the two aspartic acids, and of the D(−) glutamic acid were found to be tasteless or nearly so. The taste of L(+) glutamic acid and its monosodium salt is unique.

Effects on Food Flavour

Some observers ascribe a meat-like taste to monosodium glutamate, but others have found only a sweet saline taste accompanied by some astringency. It has a notable and usually favourable effect on food, by blending and rounding out the existing flavours without contributing any noticeable odour or taste. This improvement is most noticeable in the case of meats, fish, stews, and soups, although many vegetable dishes gain added attraction by the addition of glutamate.

On the other hand, fruit juices, sweet cakes, some dairy products, and cooked cereals were not considered to be benefited.

Attempts to determine the influence of *p*H on glutamate effects in the single food were unsuccessful, as changing *p*H produced changes in flavour greater than those produced by glutamate, which appears to be effective in the *p*H range investigated in one series of experiments, *i.e.* 3·5 to 7·2.

Monosodium glutamate accentuates sweet and salty tastes in food when they are present in less than optimal amounts. In some cases it seems to suppress sourness and bitterness, and has more influence in fat-free foods than fatty ones.

The flavour of foods is composed of many different elements, which together make up a flavour "profile." This is determined by combining the impressions of the members of a taste panel, and allows the means of studying the effect of added materials without regard to individual preferences. Seasoning agents accentuate desirable elements and suppress objectionable ones in food, without themselves being evident. For this reason, monosodium glutamate may be classified as a seasoning agent, its unique action being more of a salt than a condiment type.

A considerable amount of work has been carried out on the use of monosodium glutamate in fish products, concentrations of from 0·15 to 0·50 per cent. having been found to be best for fish cakes, soups, and the like. In pastes and sandwich spreads as much as 1 per cent. can be used. Canned oysters and lobsters are improved by monosodium glutamate. Heat and processing change the flavour somewhat, but do not produce undesirable flavours.

Evaluation of Glutamate in Food

The compatibility of glutamate with flavours present in any specific food under consideration is the first factor to be evaluated in determining the advisability of adding this substance to any given product. Glutamate can be used to advantage in combination with salt or sweet flavours, but not with acid or sour-tasting foods.

It having been decided that a particular food can be improved in flavour, the next step is to determine at which level it will produce a desirable blend. If used in too low proportions, money will be wasted. On the other hand, glutamate will stimulate taste only up to a point, beyond which additional increments are relatively undetectable. The optimum proportion must be determined experimentally, but will probably lie between 0·1 and 1·0 per cent. of the total weight of food as eaten.

Since the matter of flavour appears to depend on the total effect composed of many stimuli, the introduction of glutamate into the food formula will require a new study of the desirable proportion of other flavour modifiers, such as sugar and salt. In the presence of thickening agents, such as gum, flour, and starches, higher levels will be required than in unthickened products.

A good blend of glutamate with other flavouring components having been established, it is necessary to observe the changes in flavour which may develop during storage of the food. The persistent quality of glutamate is retained indefinitely, regardless of storage conditions. Hence, it may increase in prominence with time as other flavours change or lose their strength. It is necessary, therefore, to study the long range as well as the immediate effect of the quantity of glutamate used.

Use of Protein Hydrolysates

Monosodium glutamate is likely to be the most expensive seasoning added to the formula. It is therefore necessary carefully to study the economics of its use. This brings up the question as to the possibility of using protein hydrolysates in association with glutamate. The flavouring of foods with protein hydrolysates has made rapid progress in most countries during the last decade.

Protein hydrolysates for foods consist essentially of two types: (1) complete acid-hydrolysed proteins and (2) acid-hydrolysed proteins from which glutamic acid has been extracted. Both types are manufactured as liquids and commercially dry powders. Only the unextracted variety will be discussed.

Protein hydrolysates made with sulphuric acid as the hydrolysing agent have not been generally acceptable for food purposes, not only by reason of their comparatively high cost, but also the inferiority of their taste.

There is a body of opinion which rejects the idea that monosodium glutamate, by itself, is entirely satisfactory as a food flavouring material. Their experience has indicated that hydrolysates, which have a combination of all the amino acids, seem to give a higher quality rating, a more satisfying flavour, and a more acceptable taste than when only one of them is present. The only exception to this opinion is with respect to the use of monosodium glutamate in chicken soups.

Flavour Contribution

"Non-essential" amino acids in most instances contribute better flavour than the "essential" amino acids, and experiments have shown that several of the amino acids and their derivatives, exclusive of monosodium glutamate, have flavour significance. For example, lysine, alanine, proline, leucine, serine, phenylalanine, and aspartic acid have varying sweet tastes and contribute flavour. Methionine and cysteine impart markedly desirable tastes and, when heated, provide strong pyrogenic flavours. Valine and tyrosine are slightly bitter. These observations refer to the dextrorotary form of amino acids. Since the four components of taste are described as sweet, sour, salty, and bitter, it is clearly obvious that protein hydrolysate containing all or most of the amino acids has the constituents present to supply full and complete taste characteristics.

Combinations of Proteins

Investigations relative to the improvement of protein hydrolysates have revealed fundamental information. It has been proved that the protein should be high in nitrogen, adequate in respect to all amino acids, and should be specifically selected on the basis of glutamic acid content so as to give the maximum of flavour. Commercially these proteins are wheat gluten, corn gluten, extracted soya bean flour, casein, groundnut flour, yeast, dried distillers' solubles, extracted cottonseed meal, and fish waste.

Frequently a combination of proteins is used, and in certain instances excellent tasting hydrolysates with superior qualities are produced, such as when wheat gluten, casein, and an extracted soya flour, in proper proportions, are hydrolysed with hydrochloric acid.

In Table I is given the approximate glutamic acid content of several natural protein materials.

TABLE I

	Approx. Glutamic Acid Content of Proteins per cent.
Wheat gluten	36·0
Corn gluten	24·5
Zein	36·0
Peanut flour	19·5
Cottonseed flour ..	17·6
Soya bean flour ..	21·0
Casein	22·0
Rice	24·1
Egg albumen	16·0
Yeast	18·5

In Table II are shown some of the uses for protein hydrolysates in food products.

TABLE II

USES FOR PROTEIN HYDROLYSATES IN FOOD PRODUCTS

Soups	Pancake flour
Stews	Brawn
Broths	Mincemeat
Bouillons	Sausage meat
Bouillon cubes	Goulash
Fish	Biscuits
Gravies	Fruit cakes
Sandwich spreads	Spice mixtures
Pickle relishes	Cheese rarebits
Baked beans	Chili sauce
Processed meat	Salad dressings
Hash	Bread
Meat sauces	Poultry stuffing
Cheese spreads	Macaroni with meat sauce
Mayonnaise	

Proper discrimination in selecting protein hydrolysates or careful compounding of hydrolysates and monosodium glutamate will give not only superior taste to the finished food product, but will contribute desirably to a more profitable cost structure.

Acknowledgment is made to the authors of the papers read at the First Symposium on Monosodium Glutamate sponsored jointly by the Quartermaster Food and Container Institute for the Armed Forces, and Associates, Food and Container Institute, and held in Chicago.

The Determination of Moisture in Organic Substances

(*Continued from page 377*)

With these reservations only, the wider use of the titration method of estimating water may be welcomed for its speed, its accuracy, and, where the composition of the material to be analysed is known and any appropriate precautions have been taken, its specificity. For the accurate analysis of substances containing only very small proportions of water, containing water accompanied by other volatiles, or containing extremely unstable material liable to decompose with the formation of water, the Karl Fischer technique has often proved invaluable.

The following liquids have been used or suggested either for the extraction of the water component from a sample prior to its titration, or for the dispersal or solution of the sample so that the titrating solution may react with the water in it: methanol, which as long as it is present in not less than equimolecular proportion to the iodine, may be regarded as an inert ingredient of the Fischer reagent, is the obvious first choice, and one that should never be discarded without a full trial; decalin, previously mentioned, has advantages for certain fats and oils for which it is a better solvent; glacial acetic acid, which is also inert to the reagent, has proved useful as a dispersing agent or solvent for resinous and colloidal substances; and ethylene glycol and dioxane may equally be used where their special solvent action appears to be advantageous.

REFERENCES

[6] Pouncy and Summers, *J.S.C.I.*, **58**, 162, 1939.
[26] Hartshorn, *J. Inst. Elect. Engin.*, **92**, II, 403, 1945.
[27] Fryd, *Food Manufacture*, **XXI**, 331 1946.
[28] Morell, quoted in Aquametry, Mitchell and Smith, Interscience Publishers, Inc., N.Y., 1948.
[29] Mitchell and Smith, *ibid.*

(*To be continued*)

TO AUTHORS

FOOD MANUFACTURE is prepared to consider the publication of any books on scientific and technical subjects which authors might care to submit.

New Food Products and Equipment at Olympia

Chocolate Machinery

A recent American 16 in. coating machine, embodying a streamlined design with many novel features, and a British-made 24 in. model are among the exhibits of Bramigk and Co. The latest T.M. chocolate 5 roll refiner machine, a working model of the Greer multi-tier cooler, and a 500 lb. chocolate mixing kettle are included, as well as the Mikro atomiser which can reduce particle size down to 1 micron, a grinding machine for sugar and other commodities, and Currie Starch handling equipment.

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Packaging and Wrapping

Corrugated fibreboard cases, boxes, and trays to railway specifications, all forms of corrugated fibreboard and paper packaging, corrugated paper in rolls, sheets, cartons, and pieces, and corrugated greaseproof, Glassine, and processed papers are to be featured by the Thompson and Norris Manufacturing Company.

■

To Prevent Food Poisoning

To bring to the public's notice the importance of avoiding outbreaks of food poisoning a special scientific display is being produced by the Central Council for Health Education. Its object is to show how the most innocent food can be contaminated by lack of care and forethought.

A major attraction of the stand will be a number of microscopes, which will demonstrate the rapidity of the multiplication of germs causing poisoning.

■

Conveyor and Elevating Systems

Manufacturers of all types of plant for handling materials in bulk, packages, or individual articles in industrial processes, the British Wedge Wire Co. are showing small scale working models of a mechanical handling system for cases, a Wedge Wire rotary screen, a bottom hinged portable slot elevator, and a trolley sack hoist.

A speciality for many years has been the design and manufacture of plant using woven wire belts which have considerably increased the scope of mechanical handling in processes where the circulation of air and liquids is necessary, or where high temperatures prevail.

Pipe Fittings

The hygienic pipe fittings for the food processing industries being exhibited by The Realm Engineering Works are machined from 18/8/3 stainless steel and are available in sizes from 1 in. to 2½ in. with screwed ends to the American I.A.M.D. standard, or of the British rubber ring type. Fittings recessed for sweating on to the pipe, or flanged fittings, are also available.

Plug cocks, including the T and L ported 3-way type, are a special feature of the range, the plugs being hard chrome plated to prevent seizing.

■

Jam-making Equipment

Of particular interest to the jam industry is the latest Caleb Duckworth fruit cleaner which cleans currants and sultanas, extracting stalks, dirt, nails, and small flints. Two new machines, a jam filler which fills jam accurately into ½ lb., 1 lb., 2 lb., and 7 lb. jars, is fitted with a no-jar-no-jam device, and is clean in operation, having almost entirely eliminated drip, and a vacuum seal capper of the rotary type which vacuum seals jars of jam at the rate of 60 per minute, are on view. A can opener for the manufacturing trade completes the range on show.

Electronic Metal Detector

Outwardly the same in appearance as the previous ones, a new model of the electronic metal detector, made by Cinema-Televison, has been developed, the circuits having been completely redesigned, thereby greatly increasing their sensitivity, especially to the more "difficult" metals such as solder and aluminium.

The search head has also been redesigned and is now completely enclosed in a metal shield, which enables it to be installed near moving metallic machinery without loss in performance and simplifies installation problems. As an indication of the high sensitivity of this new instrument it recently detected in a bar of chocolate a fragment of metal having a mass of only 0·5 mg.

■

Gelatin and Agar

Conforming to a high standard of quality, and warranted edible, sparkling granulated gelatin, which is marketed in a range of units to suit the needs of the consumer, is being featured by Davis Gelatine. Also exhibited is New Zealand agar, produced from a certain species of algae. This is used extensively in the confectionery, bakery materials, and meat processing industries, as well as for bacteriological purposes.

Fruit and vegetable washer.
Photo British Wedge Wire Company.

Australian Foods

A full range of Australian food products now selling in England is being shown, and special attention is being given to the honey section, following the Federal Government's decision to co-operate with the industry in a publicity drive overseas.

Another feature is a display of tomato products, including soups, canned tomatoes, and sauces.

Most of the Australian marketing boards are taking part with displays of dried and canned fruits, wines, butter and cheese, meat, and wheat.

*

Whale Meat Novelty

A new idea in whale meat will be featured by the Whale Meat Advisory Bureau, who have developed a corned meat (similar to a top-grade bully beef), which is being packed in 6 lb. sizes suitable for catering. This will be available for tasting at the Fair both in slices and sandwich form.

The stand takes the form of a modern hygienic kitchen staffed by six demonstrators. Executives will also attend to answer queries in connexion with gradings of meat, special prices, etc.

Demonstrations are to take place throughout the Show and apart from corned beef, dishes made up from the solid-pack steak and roll consisting of cottage pie, vienna steaks, Madras curry, stuffed olives, jugged whale meat, hot pot, *vol-au-vent*, sausage rolls, and chipolata are to be served.

Air-operated pump.
Photo Gresham and Craven.

Air-operated Pump

Specially constructed with glass windows in the casing, so that the action of the pump may be observed, a 3 in. model Ejectopump is shown by Gresham and Craven. The pump, which is compressed air operated, lifts green peas in water from a suction tank through Pyrex glass piping, and delivers the peas and water through a further range of glass piping back into a trough which discharges into the suction tank. The power-operated diaphragm valves with which the pump is provided do not damage the peas in any way.

Refrigeration Equipment

The main exhibit of the S.B. Engineering Co. is the internal mechanism and refrigerating system of the continuously operated refrigerated tunnel, showing the conveyor, coils, surge drum, liquid ammonia pump, and interconnecting pipes of a typical installation. Other refrigeration equipment is also being shown.

*

Czech Food Specialities

Various food specialities are being featured by the Minerval Produce Company, who are sole agents in Great Britain for the products of Centrokomise, Ltd., of Prague, the only exporters of preserved foodstuffs from Czechoslovakia.

The main products include tomato purée, manufactured from fruit grown in Moravia and Slovakia and equivalent in quality to the Hungarian product, mushrooms, sliced and dried in modern plants and packed in airtight containers ready for use in soups, sauces, etc., and fruit juices and syrups from raspberries, cherries, redcurrants, and apples, either with or without sweetening matter. Sweet paprika for giving an appetising flavour to food, and seeds such as anise, coriander, and fennel are imported, as well as tinned fruit and vegetables.

*

The items described in the foregoing may be seen at the British Food Fair being held at Olympia from August 29 to September 9.

News from the Industry

FORTHCOMING EVENTS

Milk Processing and Control

Studies for the examinations of the City and Guilds of London Institute in milk processing and control are to be recommenced by the Chelsea Polytechnic on Friday, September 29.

The syllabus of the final examination on chemical and microbiological control of milk processing will be covered by attendance on two evenings per week as follows:

Microbiological Control. Monday, 6.30 to 8.30 p.m.

Chemical Control. Friday, 6.30 to 8.30 p.m.

In order to be eligible to sit for the final examination of the City and Guilds of London Institute at the end of the course, students are required to have passed previously the intermediate examination, but suitably qualified students who have not done so will be admitted to the final course.

*

Instruction in Biochemistry

Of particular value to industrial chemists and others engaged in or connected with biochemistry fermentation, food production, or preparation and examination of chemicals of physiological importance, is the course of lecture demonstrations to be given on Thursdays at 7.30 p.m., commencing on September 28, by A. E. Bender, Ph.D., B.Sc. (Biochemistry), A.R.I.C., Senior Chemist, The Crookes Laboratories, at Acton Technical College.

Twelve lectures, from September 28 to December 14, will be devoted to nutrition; four lectures, from January 11 to February 1, 1951, will deal with the nature and functions of enzymes; intermediate metabolism will be the subject of the six final lectures from February 8 to March 15.

*

Baking Industries Ball

Owing to another important trade function being held on the same date, it has been found necessary to hold the Baking Industries Ball and Bakery Queen Contest at the Lyceum, London, on Thursday, October 12, and not on October 18 as previously arranged.

Micro-chemical Analysis

A course of lecture demonstrations in micro-chemical analysis will be held at Acton Technical College during the autumn term on Fridays at 7.30 p.m., commencing September 22.

Divided into three parts, the course will consist of:

1. Micro-chemical analysis in general and inorganic chemistry. September 22 to October 13, 1950.
2. Semi-micro and micro-chemical technique applied to organic chemistry. October 20 to November 10, 1950.
3. (*a*) Micro-chemical analysis in metallurgical operations. November 17, 1950.
   (*b*) Micro-chemical analysis applied in analysis of oils and fats. November 24 to December 15, 1950.

Food Poisoning Conference

Food poisoning and steps taken to prevent it were discussed by more than 400 delegates at a Food and Drink Infections Conference held at Olympia on August 31. The last conference was held in 1947 and a review of progress made since then was given.

Organised by the Central Council for Health Education, it was attended by representatives from local authorities and from the food trade.

Speakers included: Professor G. S. Wilson, director of Public Health Laboratory Service; Miss Betty Hobbs, B.Sc., Ph.D., Dip. Bact., assistant in charge of Food Hygiene Laboratory, Public Health Laboratory Service; Dr. B. Schlesinger, O.B.E., of the Great Ormond Street Hospital for Sick Children; Dr. E. K. Macdonald, O.B.E., Medical Officer of Health, Leicester, and chairman of the Central Council for Health Education; and Mr. H. A. Perry, M.R.San.I., M.S.I.A., Chief Sanitary Inspector, Guildford.

The conference chairman was Sir W. Wilson Jameson, G.B.E., K.C.B., M.D., F.R.C.P., D.P.H., K.H.P., recently retired Chief Medical Officer of the Ministry of Health.

Agency Termination

The business activities in South Wales of British Jeffrey-Diamond are now being conducted from their own branch office at Dock Chambers, Bute Street, Cardiff (telephone: 1070) with Mr. F. Jackson as district technical manager. The former agency arrangement terminated on July 31.

Aerial view of the Pulsometer Engineering Works.

Industrial Progress Celebrated

Three-quarters of a century of industrial progress was commemorated by the Pulsometer Engineering Company at its Sports Day celebrations on July 8.

In 1875, in a small works in Battersea, with thirty employees, the late John Eliot Hodgkin began to manufacture the pulsometer—a new type of steam pump. Today, its large works, with nearly 1,000 employees, its branches in the large industrial towns of England, Scotland, Northern Ireland, and Wales, and its world-scattered agencies, testify to the company's growth and success.

Beginning with the manufacture of one special pump, the company ventured in several directions to satisfy industrial needs, and the success of its undertakings has created its various pumping refrigeration and water purification departments, each of which has made a vital contribution to industrial progress.

The first consignment of tinned ham to arrive for eleven years was delivered at Smithfield Market recently to John Silver, Ltd. The tinned ham, which came from Sweden, helped to bolster up the corned beef ration.

B.S.I. Annual Meeting

In presenting the report at the recent annual general meeting of the British Standards Institution, Mr. Roger Duncalfe, chairman of the General Council, explained that the work had been expanded during the year in all sections, both nationally and internationally. During the year a further Overseas Committee had been set up in Rhodesia, and the recognition of the value of British Standards in overseas markets was an increasing aid to exporters.

Sir William Larke, the retiring President, in his closing address, dwelt on the value of standardisation to the community as a whole, and expressed the view that industry must recognise its responsibilities for maintaining this central organisation.

The Rt. Hon. Sir John Anderson, P.C., G.C.B., F.R.S., was elected President for the coming year.

Prizes for New Food Ideas

A prize of a gold medal and £500 will be awarded by the Royal Society of Arts next year for an original proposal, suggesting a means of promoting the production or the economic utilisation of food in Britain.

Proposals may be general or concerned with any particular branch of food production and may cover the use of new mechanical devices or processes.

Savouries for the Vegetarian

The savouries in a new booklet of vegetarian recipes, *75 Vegetarian Savouries*, produced by the Vegetarian Society, are not of the same type as the "salty, cheese, or smoky morsel served at the end of the meal to bring an overworked palate to rest." They are substantial protein dishes, intended to form the main part of the dinner, although a tinge of austerity shows in some, reflecting uncertain supply conditions.

The recipe book concludes with some hints on gravy making, breadcrumb preparation, etc.

Vehicle Production Record

With the manufacture of 18,765 cars, commercial vehicles, and tractors during June, Ford Motor Company have established a new production record. This brings the total for the first six months of 1950 to 100,890 vehicles compared with 151,793 produced during the whole of 1949.

The £12 million re-equipment programme announced in May is now going ahead; work has already started not only on the new battery of coke ovens for which Sir Rowland Smith, chairman of the company, recently laid the first brick, but also on a new 150,000 sq. ft. building on the north side of the present factory.

S.C.I. Annual Meeting

In his Presidential address at the sixty-ninth annual meeting of the Society of Chemical Industry held in Newcastle-on-Tyne from July 11 to 14, Mr. Stanley Robson, who remains President for the ensuing year, stressed the great expansion in the chemical industry which had occurred in recent years, particularly in research.

Included in the three lectures given on July 12 was one by Dr. J. B. M. Coppock, who considered "Some Consequences of a Virile Chemical Industry on Food Processing." These were followed by the presentation of the Messel Medal to Viscount Bruce of Melbourne.

The Dunn Memorial Lecture was given by Dr. H. H. Lowry, Director of the Coal Research Laboratory of the Carnegie Institute of Technology, Pittsburgh.

During the course of the four-day meeting, many factories were visited, including James A. Jobling and Co., The Washington Chemical Co., Thomas Hedley and Co., and Imperial Chemical Industries.

Food Machinery Association

As from July 1, 1950, the activities of the unincorporated British Food Machinery Manufacturers' Association will be carried on by the recently registered Food Machinery Association.

Flour Mills Reopened

Among those present at the official ceremony to mark the opening of Rank's Solent Flour Mills, which have been rebuilt on the original site of the premises damaged during the air raids on Southampton in 1940, were the Mayor of Southampton, the Deputy Mayor and Council officials, Sir Frank Lee, Principal Permanent Secretary, Ministry of Food, Mr. Robin McAlpine, of Sir Robert McAlpine and Sons, the main contractors, as well as representatives from the docks and shipping companies.

In a short address, Mr. Joseph Rank traced the development of the mills at Southampton and said that the mill now in operation was capable of making nearly 2,000 tons of flour each week with the corresponding amount of by-products, and of making no less than 1,000 tons of animal feedingstuffs weekly.

The Institute of Physics

At the annual general meeting of the Institute of Physics held on July 20, 1950, Prof. W. E. Curtis (Professor of Physics, King's College, University of Durham, Newcastle-upon-Tyne) was elected President.

Prof. E. G. Cox was elected a Vice-President, and Dr. F. P. Bowden and Mr. G. R. Noakes were elected Ordinary Members of the Board. The Honorary Treasurer, Mr. E. R. Davies, and the Honorary Secretary, Dr. B. P. Dudding, were re-elected. Prof. H. W. Thompson joins the Board as the new representative of the Faraday Society.

The Report for 1949 which was adopted at the meeting records continued progress in activities and in numbers. During the year the Education Group and the North-Eastern Branch were inaugurated, making the seventh specialist subject Group and the eighth Branch. These fifteen Groups and Branches held many meetings and visited various laboratories; the five Divisions of the Australian Branch held thirty-nine meetings during the year.

An outstanding event was the first Convention of its kind to be organised by the Institute, which was held in Buxton for members and their ladies.

Obituary

Mr. Theodore Rendle. On July 29 at the age of 65.

For the past twenty-six years Mr. Rendle had been technical manager for Chivers and Sons.

An acknowledged authority on technical problems of processed foods, he took a keen interest in numerous professional and research organisations, and was always willing to respond to calls for his advice and services.

He was a Fellow of the Chemical Society, a Fellow of the Royal Institute of Chemistry, chairman of the Food Group of the Society of Chemical Industry, 1945-47, Vice-President of the Society of Public Analysts, 1942-43, chairman of the Jam Panel of the British Food Manufacturing Industries Research Association, chairman of the Jam Panel Research Sub-Committee and Pectin Standardisation Sub-Committee, Hon. Member of Institute of Sewerage Purification, Hon. Editor of *Food Group Proceedings* for a number of years, and joint editor of "The Nation's Food" with A. L. Bacharach.

During the war years, Mr. Rendle was one of Chivers' representatives working in close association with the Ministry of Food in the production of dehydrated foods. At the request of the Ministry of Food he visited the United States in 1945 to undertake work there in connexion with dehydration.

He took an active part in religious work, particular among the Christian Brethren, and was in great demand as a speaker at religious gatherings in many parts of the country.

He leaves a widow.

*

Mr. J. L. Bloomfield. Grocery buyer of the London Co-operative Society until his retirement in 1938, at the age of 82.

Changes of Address

Future communications to the London office of George Scott and Son (London) and Ernest Scott and Company should be addresed to Artillery House, Artillery Row, London, S.W.1. The former telephone number, Abbey 2121-3, is being retained.

*

The address of the Creamery Package Manufacturing Co. is now Mill Green Road, Mitcham Junction, Surrey. Telephone: MITcham 2981 (4 lines); telegrams: "Seepyko, Mitcham."

British Machinery in Stockholm

A wide selection of equipment, including tablet machinery, oscillating granulators, bench coating pan with hot air blower, and electrically heated automatic water stills, is to be shown by Manesty Machines at St. Erik's Fair, held in Stockholm from August 26 to September 10.

Rural Electrification

Based on a close study of the requirements of the Electricity Authorities in Great Britain and in many countries overseas, the equipment manufactured by the English Electric Company and designed for rural electrification can be divided into three categories:

1. Gear to transform and control the current from the rural feeders.
2. Equipment for power supplies for the farmer.
3. Domestic appliances to bring the amenities of the electrically-equipped home to the farming community.

Selections of this equipment, including transformers, fuse gear, farming motors, refrigerators, cookers and food mixers, were shown by the company at the Royal Show, Oxford.

Stoving Lacquers for Aluminium

An interesting method of coating aluminium products in colour by the use of new vinyl stoving lacquers, which adhere tenaciously to all alloys and are unaffected if the coated aluminium is bent through 180°, has been developed by the Tube Investments subsidiary, Drynamels.

Non-poisonous and odourless when dry, the lacquers are undamaged by immersion for one month in petrol and benzol, by soap and dilute alkali solutions, by oils and fats, and by dilute acid solutions such as concentrated fruit juices.

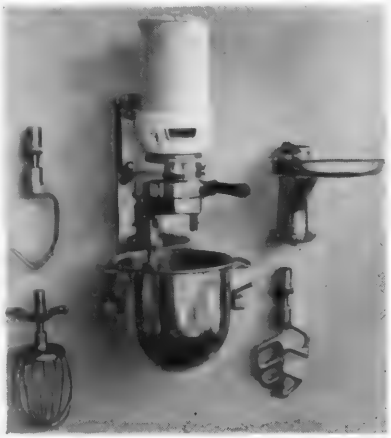
Waterproof in nature, they continue to adhere to the aluminium after prolonged immersions, and do not absorb water and whiten, as is the case with many organic coating materials. They require an exceptionally short period of stoving, 3 to 5 minutes at 260° F. being sufficient.

A satisfactory range of colours has been developed, and experiments have shown the suitability of the lacquers for the covering of such items as utensils used for food preparation, bottle closures, and food storage bins.

Mixing and Mincing Machinery

A further step towards increased performance and improved design has been achieved in the Fairfax factory mincer.

The 7½ h.p. motor transmits its torque through eight endless v-ropes to the main drive, which is supported with special combined thrust and radial ball bearings and sealed against meat juices by double synthetic rubber seals in stainless housing separated by a visible drain arrangement. Silence in operation, compactness in design, and an output of nearly 2 tons of meat per hour make this machine a useful equipment for the manufacturer of meat or other food products, as well as for extruding purposes of any description.



Fairfax Engineering are also producing a wall-attached combined mixing and mincing machine with several improved features. Driven by a ½ h.p. B.T.H. motor with reduction gear, this machine has a further planetary gear attachment which provides slow and fast speeds for the dough hook, beater, and whisk. The mixing bowl, of 3 gallons capacity, is of heavy tinned steel and easily fixed by means of cam handles. The mincer attachment, which can be quickly interchanged with the mixer, minces about 3 lb. of meat per minute.

Association helps Post Office

With a view to reducing the length of the address of the British Baking Industries Research Association, it has been agreed with the Post Office that the following will be sufficient: Baking Industries Research Station, Chorleywood, Herts.

Communications should be addressed to the Director of Research, secretary, or other official as the case may be, but the full name of the Association may be omitted.

De Luxe Laboratory Stirrer

Suitable for mounting on a standard laboratory retort stand and clamp, the Kestner laboratory stirrer, described in leaflet No. 280, is fitted with a specially designed 3-bladed propeller or interchangeable Vortex impeller. The shaft is attached to the motor by robust stainless steel coupling which can be detached instantly without the use of tools. The speed control regulator is a separate unit so that it can be placed conveniently near to the stirrer, but away from fume, splash, or heat.

A utility model stirrer which does not incorporate the drop proof motor cover or special coupling, but embodies all the principal features of the de luxe model, is also made.

Automatic Process Control

A new electrical system of control applicable to almost every industry where batch processing takes place has been devised by Dunford and Elliott.

Known as the Lindars automatic control, the equipment automatically governs the precise operations of each individual valve, motor, and thermostat, controlling where necessary the duration of such operations; each event may be indicated by supervisory lights which are fitted to the remote control unit or elsewhere.

The process may be started by a "start" push button, and will progress automatically through every operation in its correct sequence until the whole programme of events has been completed, when the control unit automatically resets itself and is ready for the programme to be started again by the depression of the push button. Provision can be made whereby, in emergency conditions, the whole process can either be suspended, or stopped and reset, at any instant in the programme.

Food Distribution Congress

The need to envisage the problem of food distribution on an international basis in order to obtain the best assessment of resources and to raise the standard of living was stressed at the International Congress on the Distribution of Food, held in Paris from June 20 to 23. This could only be achieved if producers, processors, distributors, and consumers worked together in closer co-operation to fulfil the aims of liberating and intensifying the exchange of food products.

Developments in Canning Technique

WORK AT THE METAL BOX LABORATORIES

Methods of dealing with problems concerned either with customers' products, or with the development of new containers, raw materials, and manufacturing processes, were demonstrated recently at the research division of The Metal Box Company.

The laboratory work is divided into three sections: manufacturing, customer service, and analysis. Work on soldering, including supersonic soldering of aluminium, lining and cap compound application, all forms of can and cap leakage tests, and fundamental work on stresses set up in tools during impact extrusion, is carried out in the main laboratory. Another room contains lacquer applications and stoving equipment built on a miniature scale, and a fadeometer used to determine the light fastness of inks. Tests on new lacquers, coatings, etc., are made, and new formulae evolved, where necessary, by the division; an interesting development in this section is process resistance decoration used in place of labels. New papers, films, and adhesive and coating treatments for carton and composite manufacture are also examined.

In the kitchen attached to the customer service section, formulae are devised according to requirements and problems relating to packaging are studied. In the experimental cannery and quick freezing laboratory, where problems on the packaging and processing of foodstuffs are investigated, was an exhibit illustrating the work of the company's bacteriological laboratory at Worcester. A novel piece of equipment used in the testing of cans for leakages is the "abuse chute" in which cans receive the roughest possible treatment. Experiments are made in the canning of a wide variety of foods; among those at present in progress are tests for the Ministry of Food in the canning of fresh milk. Three constant temperature and humidity rooms assist in tests made to determine the suitability of packaging materials (other than open top processed food cans) for all products.

The analysis of food for the presence of metals, impurities in solder, etc., is made in the analytical section, and a wealth of scientific information is available in the library.

Society of Dairy Technology

Members of the Society and their guests from all parts of Great Britain participated in the Summer Meeting of the Society of Dairy Technology held at the Royal Agricultural College, Cirencester, from July 18 to 20.

Papers presented at the Conference were: "Comparisons of Dairy Farming Systems," by Kenneth N. Russell, Vice-Principal, Royal Agricultural College, Cirencester; "Milk Drying," by R. Edmundson, manager, United Dairies, Hemyock; and "Technical Control of a Group of Manufacturing Creameries," by B. Bibbett, production manager, Milk and Milk Products Department, Co-operative Wholesale Society.

In addition, visits were paid to the Wootton Bassett depot of the United Dairies, where the party inspected the mechanised milk reception arrangements and milk drying on roller machines, and also to the Cricklade factory of the Co-operative Wholesale Society to see the manufacture, canning, and packing of evaporated milk. Also inspected was the effluent disposal system at this factory.

Brewing Exhibits

A 180 barrel stainless steel Yorkshire square fermenting vessel is to be used by the A.P.V. Company as their office at the Brewers' Exhibition (October 2 to 6). This vessel is one of twelve being made for the Hull Brewery Co. Inspection of the upper vessel is made possible by a platform erected at one end.

Another exhibit is to be a complete stainless steel working model brewery manufactured for the Brewery Industry Research Foundation.

Other exhibits will include complete process installations, an all-stainless Paraflow wort cooling plant with hop seed filter, aeration set, and pumps, a complete yeast collecting installation with collecting vessel, presses, wagon and auxiliary equipment, a 25 barrel stainless steel conditioning vessel, and a Burtoniser.

Citrus Fruit Juices Control

As all matters arising in connexion with the scheme covering the importation and distribution of citrus fruit juices have been completed, the Advisory Committee has now been dissolved.

Food Group Officers for 1950-51

The following is a list of officers and committee of the Food Group of the Society of Chemical Industry for the session 1950-51:

Chairman: Mr. A. L. Bacharach.
Vice-chairman: Dr. E. B. Hughes.
Hon. Treasurer: Dr. J. R. Nicholls.
Hon. Secretary: Mr. L. H. G. Barton.
Committee Members: Messrs. W. B. Adam, N. L. Allport, A. J. Amos, F. H. Banfield, E. C. Bate-Smith, A. P. Buchanan, V. L. S. Charley, J. B. M. Coppock, T. Crosbie-Walsh, J. G. Davis, E. M. Learmonth, and R. H. Morgan.

Appointments

Mr. J. J. Devlin has been appointed senior bakery officer to the British Baking Industries Research Association. He will take up his duties on October 1, 1950, about the same time as the commencement of the equipping of the new wing designed to give greater baking and bakery engineering facilities.

Mr. Devlin, who is well known in the industry, is at present bakery manager to James Blackledge and Sons of Bootle, Liverpool. He has had extensive experience in both small and large bakeries; for some time he was engaged in the teaching of baking technology at Leeds and Liverpool, and at the latter centre was head of the Department of Food Technology. He was a demonstrator and lecturer for the Ministry of Food during the war and a member of the Ministry of Food bread judging panel.

Mr. Geoffrey H. Palmer has been elected deputy-chairman of Huntley and Palmers in place of the late Lord Palmer.

Dr. J. L. Shimwell, D.Sc., F.R.I.C., has resigned his appointment as Senior Bacteriologist in the Brewing Industry Research Foundation, which was to have taken effect on September 1, and has accepted an invitation by British Vinegars, of London, Manchester, Bristol, Leeds, Leith, and Hull, to take charge of their Research Department.

The following staff executives have been appointed to the Board of Directors of F. J. Edwards:

Director: Ronald A. Johnson, Junr.
Technical Director: G. M. Hayward.
Machine Tool Director: S. Plastock.
Works Director: C. Dalley.

New Premises Needed for Expansion

Owing to the steady expansion of business both at home and overseas (approximately one-third of current production is being exported), the present premises of the A.P.V. Company have become inadequate. The company have therefore agreed to take on lease 17 acres at Crawley New Town on which to erect new premises, where all their activities will eventually be concentrated.

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The site and buildings at Hardgate Road, Govan, Glasgow, formerly known as Shieldhall House, have been acquired by the Scottish Farmers Dairy Co. for the development of a bakery. The buildings are to be demolished and the ground held until such time as the building of a modern bakery is practicable.

Census of Distribution

The draft of a new Order which will provide further safeguards against the disclosure for official use of information supplied by traders under next year's Census of Distribution has been laid before Parliament by the Board of Trade.

The non-disclosure provisions of the Statistics of Trade Act, 1947 (the Act under which the Census will be taken), contain an exception allowing the President of the Board of Trade to authorise disclosure to other Government Departments or to the Import Duties Advisory Committee of details from individual returns made under the Census.

The President has already told Parliament that information collected for the Census would be treated as strictly confidential. The new draft Order implements that assurance by forbidding the disclosure of any information relating to particular undertakings without the written consent of the person concerned except for the purposes of taking the Census, preparing the Census report, or taking any proceedings under the Act. There should therefore be no possibility of knowledge of individual returns being available outside the Census of Distribution office, even to other Government Departments or to other divisions of the Board of Trade, except for the purpose of taking proceedings under the Act, with the consent of the person concerned.

The disclosure of individual particulars in any published reports of the results of the Census is already forbidden by the Statistics of Trade Act itself.

Preparation of the pork pies at Turner's Stowmarket bakery. *Photo G.E.C.*

Electric Bakery for Pork Pies

On the edge of Stowmarket in Suffolk the 100 year old firm of W. A. Turner has recently enlarged its production to include the manufacture of pork pies in addition to making their noted Stowmarket sausages.

In support of a manufacturing policy which was determined to maintain their reputation, a completely new bakery has been laid down and equipped for the eventual production of some 80,000 pork pies per week. At present the output is of the order of 12,000, and bakery extensions are under way which will shortly be completed.

The manufacturing plan includes large scale fat production from their own meat, one of the factors enabling a completely co-ordinated utilisation scheme.

The pork pie bakery is fitted with G.E.C. twin, double deck, electric baking ovens of the Peel type which are each 4 ft. wide by 8 ft. deep, with maximum loading of 18 kW. per deck.

Tins for Proprietary Rolls

Following a substantial increase in the allocation of raw materials, Procea Products are distributing baking tins for making their proprietary rolls. The tins, specially designed by the company, produce a 2 oz. roll, with the name "Procea" embossed on each side.

Formula and baking directions for producing the roll are being distributed with the tins.

Wax Replaces Poultry Plucking

One step in the direction of the setting up of a flexible system for collecting, distributing, and processing poultry for the table so as to compete with imports from Australia, Canada, and the Continent, is the introduction of wax defeathering, which was demonstrated at Paisley recently.

In this process, the bird is immersed in wax of a suitable temperature and allowed to cool; the feathers are then stripped off, entire, with the wax. Wax recovery is in the region of 90 per cent.

The introduction of this system will speed up other sections of processing.

Lacquers for Food Containers

The necessity of using five or more different protective lacquers in the manufacture of metal food containers and closures, according to the nature of the product being packed, is obviated by the introduction of Preservex M.U. lacquer. Manufactured by Coates Brothers Inks, this lacquer is termed "universal" since it can be used in place of any or all of the fish, vegetable, fruit, meat-resistant, or vinegar-resistant lacquers. Besides the gain in convenience, and avoiding the risk of confusion, it is less critical in application than some of these lacquers, in that it can be successfully stamped at higher film weights. It also gives a clean burnished effect with good adhesion and resistance to damage.

BOOKLETS RECEIVED

Mechanical draught, by means of which air supply to furnaces can be closely regulated so as to obviate heat losses, is fully described in a recent Sturtevant publication. Induced, forced, and balanced draught, grit elimination, various types of fans, and information required for tendering are dealt with in this booklet, which is well illustrated throughout.

▪

A new issue of preference shares for The Metal Box Company Overseas has been proposed, and the company's interests abroad which form the background to this development are outlined in a brochure issued with the annual report. The leaflet shows the scope of the organisation and the continued expansion of its activities overseas.

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Complying with the requirements of the 1937 Factory Act, the Tangye perfected industrial heater is illustrated and described in the company's latest publication. Large radiation surface area, maximum heat from fuel, effective control of combustion, and interchangeable sections are important features of this heater.

▪

Three more booklets have been published by the Purchasing Officers' Association in their Raw Materials Survey Series; these cover the subjects of timber, wool, and cereals. The survey of cereals is divided into three parts: general notes on the common cereals; the economic backgrounds to bread grain and to coarse grain; and the marketing of wheat.

▪

The natural derivations, geographical sources, characteristics, and applications of chemicals, drugs, and essential oils supplied by J. Brummer are given in a new issue of their pocket guide. The booklet is well illustrated and should be of great interest to users of these natural products.

COMPANY NEWS

Bearing in mind the changes in costs that had taken place during the year, the results were very satisfactory, said Mr. R. B. Gunner, chairman of R. Gunner, Ltd., in his statement on the directors' report and accounts for the fifty-two weeks ended April 1, 1950. Increased sales, due to the acquisition of Walter Holland and Sons and the opening of new branches, had played a part in the achievement of these results.

During the year the dividend on the preference shares was paid for the period up to September 30, 1949, and for the half-year to March 31, 1950. On November 30, 1949, an interim dividend at the rate of 30 per cent. was paid on the ordinary shares (prior to the issue of two bonus shares for each share held), and it was now proposed to pay a final dividend at the rate of 12 per cent. on the present capital.

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Sales were lower during the year under review, said the Rt. Hon. Lord Luke, chairman, at the fifty-third annual general meeting of Bovril, but, having regard to all the circumstances, could be considered to have maintained a satisfactory volume. Export sales in 1949 were the best ever recorded.

A final dividend on the deferred stock of 10 per cent. was recommended, making 12½ per cent. for the year.

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Satisfactory home and export trading were reported by the chairman, Mr. A. Maitland Jacob, at the twenty-eighth annual general meeting of W. and R. Jacob and Co.

The demand for cream crackers continued at a high level, and increased fat rations had enabled greater production of these and other plain biscuits. A reduced sugar ration prevented increases in the production of sweet biscuits, although the range had been widened by the introduction of some pre-war varieties. Permission to pack biscuits in packets was granted during 1949, and they were now sending out a high proportion of cream crackers in ½ lb. packets.

▪

After emphasising that, in the year under review, the Hovis group had to pay £220,085 in taxation in relation to a total profit of £428,647, the chairman, Mr. J. F. Morton, listed the adverse effects on industry of such high taxation rates.

Full maintenance of sales and expansion at home and overseas was reported; the new Manchester mill should be in production by the end of 1952, and the U.S. and French subsidiaries were making satisfactory progress.

A final dividend maintained at 10 per cent. on a capital increased by the 12½ per cent. scrip bonus, following an interim of 10 per cent. on the smaller capital, was declared for 1949-50.

OBITER DICTA

• Peacocks wanted for banquet.—*Advertisement in the "Sunday Times."*

• Bad eggs are no new phenomenon at all; they have always been part of our civilisation.—*Mr. M. Webb, Minister of Food.*

• Is it not a fact that the wholesalers are all Socialists and had a store of rotten eggs because they had private news of an early General Election?—*Sir Waldron Smithers, M.P.*

• A Paris restaurant, well aware of the liquid temptations which surround visitors to the French capital, is putting on a special breakfast of "Tomato juice; two raw eggs; black coffee, two aspirins and our sympathy."—*Peterborough in "The Daily Telegraph."*

• I am also convinced that when Americans come to Britain they do not want or expect exclusively American food, American service, American scenery, or American habits. If this was all they desired, they would probably stay at home.—*Major G. C. S. Black at the Grosvenor House, Park Lane, meeting.*

• I can only share the hope of one disillusioned person outside this House who said recently, that if the Minister ran the groundnut scheme as a military operation, he hoped that the Secretary of State for War was now not running the British Army as he ran the groundnut scheme.—*Mr. Lennox-Boyd, M.P.*

• We are dealing with a Clause which is to provide the machinery for a scheme to enable farmers to have a subsidy for the use of fertilisers. It involves not only the Clause, but five sub-clauses, fourteen sub-sub-clauses and two sub-sub-sub-clauses, and then we do not know what the scheme is.—*Mr. Joynson-Hicks, M.P.*

• I usually start with two orders of melon, two or three juices, and one or two soups. Then I have fish. If there are three meat choices, I have some of all three—with vegetables, of course. And then three or four desserts. If I'm not hungry I will knock out one of the meats and maybe two of the desserts.—*Bob Morris of Yale University's lacrosse players.*

World Food News

Low U.S. Wheat Crop Estimate

The U.S. Department of Agriculture crop report indicates that this year's wheat harvest may be the lowest in the United States since 1943.

Cold weather and drought have caused a drop of nearly 74 million bushels below the previous month's forecast to a total of approximately 690 million bushels for the winter wheat outlook. Agriculture officials have said that if the spring wheat yields are only average, this year's total crop may fall below 1,000 million bushels.

Eviscerating Machine for Fish

Particularly useful for handling small fish such as herring and anchovies, a machine for beheading and eviscerating fish has been developed in the laboratories of the Fisheries Research Board of Canada.

The fish are conveyed to a circular knife which partially severs the head to just below the nape and backbone. This cut provides a place for insertion of a spring which is triggered for release whereby the head of the fish is completely severed from the body and the entrails are removed at the same time.

Patent rights for the manufacture and sale of this machine are available through licensing arrangements by Canadian Patents and Development, Limited, National Research Building, Sussex Street, Ottawa, Canada.

U.N. Secretariats at Work

The second in a series to be published by the United Nations secretariat at the request of the Economic and Social Council, *The Catalogue of Economic and Social Projects, 1950*, lists, describes, and classifies the work of the secretariats of the United Nations and of the specialised agencies in the economic and social fields, covering the full range of activities in work programmes under review, including research studies and investigations, as well as technical, service, and other operational activities. Information on action taken with regard to priorities within each work programme and budgetary estimates or explanations of the nature of the cost figures cited in descriptions of individual projects are also included. The Catalogue is available from H.M.S.O., London.

Soya Processing Plant for Brazil

An experimental plant for the processing of soya beans with a daily capacity of six tons is scheduled to begin operations at Marilia, State of São Paulo, Brazil, in October. Financed by the Government of São Paulo, the plant will produce salad and cooking oils, and soya meal.

If this experiment is successful, a larger plant is to be erected by private interests for the processing of soya beans on a commercial scale.

New U.S. Plant Fungicide

A new fungicide to fight plant disease has been developed by Standard Oil Development Company, the chief research affiliate of Standard Oil Company (New Jersey) in co-operation with Rutgers University. The fungicide, known as SR 406, is claimed to be the nearest approach yet made to a universal weapon against plant disease, and commercial production is expected to begin next year.

The company state that the fungicide has been found to be effective against most fungous diseases of plants, including early blight of tomato, late blight of potato, and leaf spot and brown rot of cherry.

The Californian Spray Chemical Corporation has been licensed to manufacture and distribute SR 406 in the United States; foreign sales will be handled by Jersey Standard affiliates.

Antibiotic Saves Young Pigs

Production of more pork at less cost but with the same farming facilities is promised by recent discoveries involving the use of the antibiotic aureomycin, it is reported by the American Meat Institute.

Recent reports to the American Chemical Society indicate that aureomycin, along with vitamin B_{12} in APF (the animal protein factor derived largely from meat scraps and tankage produced in the packing industry) will greatly accelerate growth. Now it has been discovered in the industry that aureomycin, to a greater degree than other antibiotics, also is capable of drastically cutting down losses of newly born pigs. Each year thousands of new pigs die or make poor progress largely because of complicated digestive troubles or so-called "baby pig disease." These life-saving discoveries have just been reported as the result of studies at the Hormel Institute of Austin, Minnesota.

Newly born pigs which figured in the Minnesota research not only showed no sign of unthriftiness or of the type of illness which usually affects very large numbers of small animals, but, with aureomycin added to their diet, they also gained weight at a rate greater than that of pigs on regular basal diets.

If the demand for aureomycin is great enough, large scale production might materially reduce its cost.

An electrolyser for producing pure hydrogen and oxygen was shown by Bamag on the stand of their associates, the Compagnie de Fives-Lille, at the recent International Fair in Lyons.

Fish Factory goes to Sea

INNOVATIONS IN U.S. TRAWLER DESIGN

Designed and engineered to prepare and freeze the edible fish immediately, and to process all the fish waste or gurry and non-edible fish for the extraction of oil and the production of dry, bagged fertiliser meal, the Harris floating fish factory *Oceanlife* is equipped with five main units: deck and trawling machinery, factory machinery, refrigerating equipment in duplicate, quick freezing equipment operating at −26° F. or −32·2° C., and fish meal and oil processing equipment. When wanted, two additional units for liver oil processing and dehydration can be furnished.

The arrangement of the vessel's five main units and the co-ordination of the operation of these units and their component parts for practical and profitable production at sea, which is quite different from land factory operation, is the result of seven years' research and study by Mr. Leonard B. Harris, naval architect and President of the Harris Floating Fish Factory, Inc.

Handling of the fish is practically all automatic, mainly by gravity means, from the landing of the fish on deck right through to the storage of the finished products. This avoids the usual damage from forking with its unsightly, unsanitary, and wasteful fork holes. The hoppers, elevators, conveyors, and cutting and packing tables are all designed so the fish, fillets, gurry, etc., will not get out of control during rough weather. One minor but important feature is the provision of window cleaner type belts to make workers secure at their table operations under ship-motion conditions.

The location of fish pens on the factory deck is an innovation in trawler design. Their purpose is to make it possible to fish and haul 24 hours a day, whereas the factory can probably get through with a 10 or 12 hour day, thus avoiding a double-shift expense for cutters, packers, etc. The quick freezers will carry on for 24 hours. Also provided at the rear of the hopper is a flap-gate which allows the fish, after gutting on deck, to be diverted either to the pens or to the factory scaling tables. The factory hands can draw on the pen fish during spells of light fishing, or on the voyage back to port.

When the trawler net is hauled aboard and dumped on the main deck, the fish are sorted in the usual manner. The edible fish, after slitting and gutting, go down special chutes to the scaling and cutting tables on the tween-deck, where they are filleted and passed on a conveyor through the brine washing tank. After washing, the fillets are weighed, placed on wrappers, put into 5 lb. packages, which are loaded on trays, and conveyed to the quick freezers. The quick freezers produce flat, well-formed packages that fit easily into the 50 lb. cartons, which pass by gravity down spiral chutes to the zero cold storage.

On a fully equipped vessel, the non-edible whole fish, such as different varieties of shark, the gurry from main deck gutting, and the heads and bones from the tween-deck cutting tables, go by chute or conveyor to a prebreaker or disintegrator, which reduces them to a macerated form, handling large, hard cod heads and other material regardless of toughness or size. This macerated material passes to a hopper which in turn feeds it to the digester cooker by means of a variable speed, automatic screw conveyor that regulates the input of the material.

From the cooker the material is discharged into a press, where the maximum amounts of oil and stickwater are extracted and passed through centrifugal separators, from which the oil is pumped to the double-bottom fish oil storage tanks and the stickwater pumped overboard. The pressed-out residue passes through the discharge outlet of the press, is fluffed up to make it ready for drying, and enters the drier by means of an underfeed conveyor. After the meal is dry, it is cooled and automatically delivered to the grinder, from which it is bagged and sent to storage.

When the vessel reaches port the finished products can be discharged through unloading hatches through the tween and main decks for delivery to the market. The products require a minimum of wharf space and handling, and the vessel can unload at any port, using its ship-to-shore telephone to arrange for refrigerated trucks to meet her.

Albumen from Fish

A new process for producing albumen from fish waste has now been put into commercial operation in Norway. Before the war, Germany manufactured a similar product which, however, tasted and smelt too much of fish to be able to compete with albumen produced from milk, groundnuts, coconuts, or soya beans.

The Norwegian firms of E. O. Collett and Co., Oslo, and Astrup and Co., Kristiansund, are now producing albumen at the rate of over 600 lb. of dried albumen a day —equal to the daily output of 100,000 hens. Ten to twelve lb. of fish waste, mainly cod, are required for the production of 1 lb. of the product, which will sell at about 6s.

Production is carried out by a completely chemical - mechanical process, and from the time the fish enters the pipeline at one end of the factory until it finally emerges at the other end in the form of a dry white powder, it is not touched by hand. A 1/80th part of an ounce of the powder is sufficient to produce 8 pints of "cream." In several respects the artificial albumen is claimed to be better than the natural product; it contains 80 to 90 per cent. pure protein, and can be used for baking, ice cream, puddings, cheese, soup powder, and mayonnaise.

OVERSEAS ENQUIRIES

Peanut Oil Refiner

The United Kingdom Trade Commissioner at Brisbane reports that a new co-operative association for manufacturing oil from peanuts, entitled the Northern Peanut Growers' Manufacturing Co-operative Association, has been registered by the Queensland State Government.

The Association is purchasing an oil presser from an Australian firm, but is understood to be considering the purchase at a later date of a refiner, with a capacity of five tons of oil, from the United Kingdom.

Interested United Kingdom manufacturers are invited to send full details, including prices, delivery dates, and any available literature of suitable plant they can supply, direct to the Association at Morganbury, Via Mareeba, North Queensland.

*

Food Processing Plant

The United Kingdom Trade Commissioner has received an enquiry from Ryan Bros. Western, Ltd., 110, James Avenue, E. Winnipeg, manufacturers and importers of butchers' and packers' supplies, distributors of food processing machinery, and manufacturers of refrigeration equipment, who wish to represent British manufacturers as distributors (though not necessarily on an exclusive basis) of electric meat grinders, meat slicers, coffee grinders, potato peelers, food cutters, mixing machines, dish washing machines, and all types of food preparing machinery suitable for hospitals, and hotel, restaurant, and catering trades.

The company have been established in Winnipeg since 1906, and operate from the head of the Lakes to Vancouver Island. They have excellent premises with first-class warehousing, and showroom facilities are maintained in Winnipeg; they enjoy a high reputation in Winnipeg and are regarded as being suitable to represent United Kingdom firms.

Firms who are interested in this enquiry should communicate with the company, giving full details of their products.

*

Juice Extractors

The United Kingdom Trade Commissioner at Kingston has advised the Commercial Relations and Exports Department of the Board of Trade that Machinery and Service, Ltd., 10, East Street, Kingston, Jamaica, have enquired whether juice extractors are available from the United Kingdom. The type required is one which automatically separates juice from pulp, skin and seeds, and is capable of extracting the juice from a crate of oranges in from three to five minutes, depending upon the size of the fruit.

United Kingdom manufacturers who are in a position to supply the required equipment are invited to send full details of their machines, including prices, delivery dates and any available literature, direct to the company.

*

Fruit Processing Equipment

The Second Secretary (Commercial) at the British Embassy, Kabul, reports that a new company called the Shirkat-i-Tijarati-o-Sanati-i-Mewa (Fruit Processing and Trading Company) has recently been floated for the purpose of dealing with the cleaning, sorting, packing, canning, dehydration, etc., and export of Afghan fruit (including grapes, peaches, and apricots) and nuts. In the first instance the company is likely to deal with large quantities of raisins and sultanas.

This company is reported to have an authorised capital of 100,000,000 Afghanis and 60 per cent. of the shares are to be held by the Afghan National Bank. Mr. Yakub Khan, the Vice-President of the Commercial Department of the Afghan National Bank, who is to be the Director of the new company, would be glad to receive particulars of suitable equipment produced by United Kingdom manufacturers and also advice on methods of cleaning, sorting, packing, canning, and dehydration.

The Second Secretary at Kabul suggests that United Kingdom manufacturers likely to be interested in this possible trade opening should send him details of their products likely to be of interest to the company, together with prices, literature, and other relevant information, which he will arrange to deliver to Mr. Yakub Khan.

Tea by Pressure Cooking

Commonwealth Controller of Food Services, Dr. R. C. Hutchinson, and the Senior Equipment Engineer, Mr. J. E. Excell, are reported to have patented an idea of infusing tea by pressure cooking. Water is percolated through a small metal container inside a domestic pressure cooker.

It is claimed that the new method uses only a quarter of the amount of tea, that the brew could be reheated without harm, and that aromatic oils are brought out which ordinary boiling cannot release.

The idea is being tested out in a Commonwealth cafeteria in Melbourne.

New Zealand's Biscuit and Sweet Industry

RECORD PRODUCTION FIGURES

New Zealand today is to a great degree self-sufficient in biscuits and confectionery. Manufacture of the two products is closely inter-related, as indeed it has been for many years, and, although import restrictions have stimulated an expansion of output from local factories, the industry is one of the oldest and most firmly established in the country. There are eleven major firms concerned with biscuit and sweet making, but production on a modest scale is widespread, and according to the Government statistician there are now more than 70 factories producing either biscuits or confectionery or both. Production has expanded steadily since the war.

There have been some token imports of chocolates and other confectionery from the United Kingdom within the past twelve months. While attracting attention by their novelty compared with local products, they were generally more expensive to the public than the product of local factories, and did not sell as rapidly as had been expected. Imported biscuits have been unobtainable for some years.

The range of local biscuit producduction has been extended in the last two or three years, and the recent removal of biscuits from price control is expected to stimulate the production of more fancy lines.

According to the latest complete figures, those for 1947-48, production of biscuits in that year reached 12,848 tons, a record, except for the war period, when there was heavy production for export account. Confectionery produced in 1947-48 totalled 12,635 tons, a figure second only to the 1939-40 record of 12,906 tons. Grain products and ice cream cones, at 3,500 tons, also reached a new record in 1947-48.

Seashore Fish Cannery

The largest and most up-to-date Yugoslav fish cannery has been built on the seashore at Zadar, North Dalmatia, to enable incoming fishing vessels to deliver straight into the factory. This will ensure maximum freshness and consequently high quality of the finished product.

The factory is to include a well-equipped research laboratory.

Fruit Sorting by X-ray

As many as 600 oranges a minute can be inspected and sorted into one of six different quality grades by means of an improved version of an American X-ray machine.

The principle upon which the machine operates is that as X-rays are absorbed by juice, low quality oranges transmit more X-rays than good ones. A beam of X-rays is shot at each orange for one hundredth of a second and the amount of radiation passing through is measured electrically. This electrical reading operates a gate to direct the fruit into its appropriate grade.

Limerick's Condensed Milk Plant

New plant capable of condensing 4,000 gallons of milk per hour has been installed at a cost of £60,000 at the condensed milk factory at Lansdowne, Limerick.

There are only two other plants of this type in operation—one in the United States and the other in New Zealand.

The initial operations of the stainless steel plant, which has greatly increased production, are being superintended at the factory by an American engineer, Mr. Charles Fuller.

Plastics from Fish Waste

Experiments on the production of plastic materials from fish waste, undertaken by Wm. A. Mohn and Son of Bergen, have progressed so far that production on a commercial scale can be started in the near future. Approximately 12,000 tons of fresh fish or fish waste are required for the production of 1,000 tons of plastic material. Torsk is said to be the most suitable type of fish.

Superfine Sugar from Texas

A new superfine sugar, the grains of which are half as large as any other extra-fine sugar, has been introduced by the Imperial Sugar Company of Texas. The new granulated sugar dissolves almost instantly in hot or cold drinks, and can be used for uncooked icings and fillings for cakes and pastries.

Vegetable Milk in India

The Indian Council of Agricultural Research is exploring the possibilities of introducing vegetable milk into the country. This will be obtained from certain milk-yielding trees to be grown in Bombay under a three-year experimental scheme sanctioned by the Government.

Such trees, which yield milk analogous to cows' milk, are known to exist in the hot and temperate regions of Venezuela; incisions made into the bark of the tree release a profuse flow of milk, which is rich in cream content and possesses an agreeable flavour. In addition to its high nutritive value, this milk can be used medicinally for the treatment of asthma.

News from the Ministries

Imported Deciduous Fruit

The Imported Deciduous Fruit Order, 1947, as amended, which prescribes maximum wholesale and retail prices for imported plums, nectarines, apricots, peaches, and grapes during certain periods each year, was revoked on July 18.

Approved Cleansing Agents

Under the Milk and Dairies Regulations, 1949, which came into operation on October 1, 1949, the use of oxidising or preservative agents approved by the Minister of Agriculture and Fisheries and the Minister of Food is permitted in the cleansing of dairy equipment as an alternative to scalding with boiling water or steam.

The products approved by the two Ministers are Deosan (Deosan, Ltd.); Chloros (I.C.I. (General Chemicals), Ltd.); Dairozon (B. Laporte, Ltd.); Hyposan (Voxsan, Ltd.); and Delsanex (Yare Industries, Ltd.).

The use of these products will not, however, be effective unless the milk vessels and appliances have been thoroughly cleansed and all grease removed. All traces of the solution must be removed before the equipment is again brought into contact with milk.

All the above products are solutions of sodium hypochlorite. Approval cannot be given at present to any product unless it is a hypochlorite and conforms to certain standards, particulars of which can be obtained from the Ministry of Agriculture and Fisheries (Dairy Husbandry Branch), 14-21, Chester Terrace, Regent's Park, London, N.W.1.

Canned Meat Imports

Australia and New Zealand have now been added to the list of countries from which canned meats (other than corned beef, mutton, or pork, and roast or boiled beef, mutton, or pork) may be imported under the block licensing arrangements previously announced.

The necessary arrangements have been made with H.M. Customs and Excise. Importers who already hold an appropriate licence of the C.M.I. series will be allowed to import canned meats as specified from these sources without amendment to their licences.

Importers not already in possession of the appropriate licence who wish to share in these arrangements should submit an application (in duplicate) on Board of Trade form ILD/A, supplies of which may be obtained from the Board of Trade, Import Licensing Branch, Romney House, Tufton Street, London, S.W.1, or from the usual Customs Offices.

For administrative convenience, importers are ask to send such applications to the Board of Trade through the Ministry of Food, Private Imports Branch, Meat and Livestock Group, Government Buildings, Epsom Road, Guildford, Surrey.

Egg Products

The Egg Products (Control and Maximum Prices) Order, 1946, has been amended so as to fix reduced maximum wholesale and retail prices for egg products (other than prepacked egg products). These prices came into force on July 15, 1950.

Bread Subsidy for Scotland

The rate of bread subsidy in Scotland will be increased from 4s. 11d. to 7s. per sack with effect from April 23, 1950.

This increase of 2s. 1d. per sack takes into account the higher costs of delivery resulting from the rise in the price of petrol. As in England and Wales, but for the first time in Scotland, the new rate includes an allowance for trends of 50 per cent. of the calculated increase of subsidy.

Marking of Pre-packed Food

A new Order, under which prepacked food wrappers must show the amount of the contents, has been made by the Board of Trade and comes into operation on November 1, 1950.

This Order, The Prepacked Food (Weights and Measures; Marking) Order, 1950 (S.I. 1950, No.1125), takes over the weight and measure provisions of the Ministry of Food's original Labelling of Food Order, 1946. The Ministry of Food have accordingly amended their Labelling of Food Order.

While the Board of Trade's new Order closely follows the Ministry of Food's original Order, it contains several modifications, the principal of which are as follows:

1. Some specified articles of food (including saccharin tablets, cereal breakfast food biscuits, and nutmegs) are now to be described by number.
2. If metric weights and measures are used, the Imperial equivalent must also be shown on the label.
3. The maximum amount of food exempted because of the smallness of the package making labelling impracticable has been increased from half an ounce, or half a fluid ounce, to one ounce, or one fluid ounce.
4. Bath Chaps, fish not packed in cans or glass containers, honey in comb, micro-biological preparations for addition to food, single toffee apples, uncooked beef or pork sausages, and whole cooked beetroots, have been added to the list of exempted articles.

The Order contains a code setting out the precise requirements for the proper marking of prepacked articles of food.

Packers and wholesalers affected by the Order may obtain advice on the method of marking any prepacked article of food on application to the Controller, Standards Department, Board of Trade, 26, Chapter Street, S.W.1.

Synthetic Cream

Arrangements have been made for the importation of a limited quantity of synthetic cream from Denmark, Holland, Norway, Sweden, and the Irish Republic under individual licence.

The synthetic cream to be imported under these arrangements should contain not less than 28 per cent. fat and should be packed in containers of not less than seven pounds capacity.

Applications for import licences should be made in duplicate on the usual form ILD/A, obtainable from the Board of Trade, Import Licensing Branch, Romney House, Tufton Street, S.W.1. For administrative convenience, completed application forms should, in the first instance, be submitted to the Bakery Division of the Ministry of Food, London Road, Stanmore, Middlesex, and should be endorsed with the following information:

(*a*) Composition of the synthetic cream, including percentage of fat, and, if present, sugar.
(*b*) Prices f.o.b. and c.i.f.
(*c*) Type and weight of pack.

Imports of Cake Mixtures

Arrangements have been made for the importation of a limited quantity of cake mixtures for the bakery trade from Denmark, Norway, Sweden, Holland, and the Irish Republic.

Applications for import licences should be made in duplicate on the usual form ILD/A, obtainable from the Board of Trade, Import Licensing Branch, Romney House, Tufton Street, London, S.W.1. For administrative convenience, completed application forms should, in the first instance, be submitted to the Bakery Division of the Ministry of Food, London Road, Stanmore, Middlesex, endorsed with the following information:

(*a*) Composition of the cake mixture.
(*b*) Values f.o.b. and c.i.f.
(*c*) Type and weight of pack.

The bakery trade cake mixtures to be imported under these arrangements should be packed in containers of not less than 7 pounds capacity, for sale to manufacturing users. They should not contain:

(*a*) Dried fruit.
(*b*) More than 15 per cent. dried egg solids and/or hen albumen.
(*c*) More than 20 per cent. skim or full cream milk powder.
(*d*) More than 60 per cent. sugar and/or glucose.

New Members for M.M.B.

The Milk Marketing Scheme (Amendment) Order, 1950, which was recently made under Section 15 of the Agricultural Marketing Act, 1949, requires the Minister of Agriculture and Fisheries to appoint a number of members to the Milk Marketing Board. In accordance with this requirement the Minister has now appointed Sir Frank Ware, C.I.E., F.R.C.V.S., Mrs. Edith Webb, and Mr. A. Baillie to be members of the M.M.B.

Mineral Oil in Food

The Mineral Oil in Food Order, 1949, has been amended with effect from August 1, 1950. The amending Order provides that the prohibition in the use of mineral oil in food shall not apply to:

1. Prunes, currants, sultanas, and raisins containing not more than 1 per cent. mineral oil.
2. Manufactured foods made with prunes, currants, sultanas, or raisins containing not more than 1 per cent. mineral oil.

The amending Order is intended as a temporary measure only. It is necessary because it has recently been found that stocks of dried fruit intended for distribution for the Christmas trade have been dressed with minute quantities of liquid paraffin in accordance with existing commercial practice in the countries of origin.

Cake Decorations from Holland

Arrangements have been made for the importation of a limited quantity of cake decorations from Holland under specific licence. The total quantity which may be imported by each applicant may not exceed 5 tons.

Applications for import licences should be made in duplicate on the usual form ILD/A, which is obtainable from the Board of Trade, Import Licensing Branch, Romney House, Tufton Street, S.W.1. For administrative convenience, completed application forms should, in the first instance, be submitted to the Bakery Division of the Ministry of Food, London Road, Stanmore, Middlesex, endorsed with the following information:

(*a*) Description and quantity of each type of cake decoration to be imported, within the permitted total of 5 tons.
(*b*) Values f.o.b. and c.i.f.
(*c*) Type and weight of pack.

Mexican Trade Negotiations

FREE DEVELOPMENT OF TRADE URGED

Conversations to arrive at an agreed basis for the development of trade between the United Kingdom and Mexico took place in London during June between the Mexican Economic Mission under the leadership of Señor Carlos Novoa, President of the Bank of Mexico, and a United Kingdom Delegation, consisting of representatives of the Board of Trade, Foreign Office, Treasury, Ministry of Food, and the Bank of England. Señor Novoa and members of his Mission also saw and had conversations with the Chancellor of the Exchequer, the President of the Board of Trade, the Minister of Food, and the Ministers of State for Economic Affairs and Foreign Affairs.

As a result of these discussions, a Minute, recording the understanding reached between the two Governments, has been signed. This understanding was arrived at within the framework of the existing payments arrangements for transactions between the United Kingdom and Mexico, which remain on a convertible sterling basis.

Provided that agreement is reached between buyers and sellers in the normal way on such questions as price and quality, the United Kingdom Government will authorise the importation of Mexican commodities to the total value of approximately £4 million in the year ending June 30, 1951. The Mexican Government have declared a corresponding readiness to use their good offices to facilitate the importation of United Kingdom goods into Mexico. If, as a result of the understanding now reached, United Kingdom exports are able to establish an expanding market in Mexico, the United Kingdom Government will give favourable consideration to authorising the importation of Mexican products to a greater value. The two Governments also expressed a common desire that any obstacles now impeding the free development of trade between the two countries should be eliminated as soon as practicable, having regard to their respective balance of payments situation.

Prices of Feedingstuffs

The recent Feedingstuffs (Prices) (Amendment No. 2) Order, 1950, revokes the First Schedule to the Feedingstuffs (Prices) (Amendment) Order, 1950, in which basic prices were set out for imported and processed wheat and oats for each month of the current crop year, *i.e.* up to and including June, 1951, and substitutes therefor a new Schedule giving effect to these prices up to December, 1950, only.

It has been necessary to make this amendment because the powers to make such Orders do not at present extend beyond December 10, 1950. Subject to the grant by Parliament of a prolongation of these powers, the Minister of Food will make a further Feedingstuffs (Prices) Order later, prescribing basic prices for the remaining months of the current crop year.

Decontrol of Dates

As supplies of dates are now fully sufficient to satisfy the demand, the Minister of Food has freed all dates from price and other controls.

To give effect to this decision, the Dried Fruits (Amendment No. 3) Order, 1950, which came into force on July 2, 1950, has been made.

Standard for Ice Cream

It was announced by the Ministry of Food in November, 1949, that the Food Standards Committee were of the opinion that a standard was, in principle, desirable for ice cream; the Committee, however, recommended that action should be deferred, since, because of the scarcity of fats and milk powder, a satisfactory standard could be prescribed at that time only at the expense of a reduction of supplies of ice cream.

The supply of fats and milk powder has now improved and the Ministry of Food has now authorised publication of a recommendation by the Committee that an interim standard of composition be established for ice cream of 5 per cent. fat, 10 per cent. sugar, and 7½ per cent. milk solids other than fat. While the Committee are agreed that this is the highest standard that can be introduced in present circumstances, they consider it should be progressively improved as supplies of ingredients become more plentiful. Moreover, the Committee consider that in the long term the description " ice cream " should be restricted to a dairy preparation containing a high proportion of milk solids.

To ensure that the introduction of this interim standard will not reduce the total supplies of ice cream available to the public, the Ministry of Food is making arrangements for allocations of fat and of milk powder to the trade to be increased. Supplies of imported sweetened fats (mixtures of sugar and fats) available to the trade should not be less this year than in 1949.

The ice cream trade and Local Authorities' Associations were consulted by the Committee, but a period of 28 days was allowed for any representations from interested parties before the recommendation was further considered.

Import Relaxations

In accordance with the statement made by the Chancellor of the Exchequer in the House of Commons recently, the Board of Trade have announced that existing open general licences issued in connexion with the policy for the liberalisation of trade have been extended to Belgium, Luxembourg, and the Belgian Congo with effect as from July 17. A large range of goods from these countries has thus been freed from import licensing restrictions.

In the case of open individual licences which exclude Belgium, Luxembourg, and the Belgian Congo, holders should enquire from the Board of Trade, Import Licensing Branch, Romney House, Tufton Street, S.W.1, as to the steps to be taken if they desire their licences to be extended to these countries.

Sugar for Bees

Beekeepers may obtain a maximum allowance of 10 lb. of sugar per colony between August 1, 1950, and January 31, 1951. This allowance, together with the stores of honey which beekeepers should leave in the hives at the end of the season, is for winter feeding.

Applications for permits must be made during the period August 1, 1950, to January 31, 1951, on the official application form obtainable at local food offices. The completed form should be countersigned by a responsible person and returned by the applicant to the food office.

An additional maximum allowance of 5 lb. of sugar per colony for spring feeding will be made available between February 1 and June 30, 1951. Beekeepers may, if they wish, draw this allowance with the winter one.

Information and Advice

Effervescent Health Saline

B.4478. *We wish to obtain some information regarding the manufacture of effervescent health saline.* (Western Australia.)

The following is a suggested formula for effervescent health saline:

	lb.
Powdered tartaric acid	30
,, sodium bicarbonate ...	30
,, magnesium sulphate ...	15
,, cream of tartar	30
,, magnesium citrate ...	30
,, sugar (icing)	60

If necessary, a lemon flavour (7 oz.) may be added.

All ingredients should be screened through 40 mesh (to free from foreign matter or lumps), and well mixed in a suitable steam jacketed mixer. After a 15 minute mix, the steam should be turned on to bring the contents to 95° to 105° C., the mixing being continued until a uniformly plastic condition has been achieved. The mixture is then passed through a sieve of 10 or 12 mesh, and the granules dried at a temperature not exceeding 55° C. The granules are then ready for packing in tins with well fitting lids.

Silver Cachous

B.4538. *Please supply list of the plant used in the manufacture of silver cachous and also a suitable silver polishing agent.* (South Africa.)

The manufacture of silver cachous is divided into two parts: the production of the sugar centres and the coating of the centres with silver leaf.

The plant required for the first operation consists of copper revolving pans and small steam kettles in which the syrups are prepared. For the coating process, glass revolving pans are required.

Silver cachous require no extraneous polishing agent. The polish is acquired by allowing them to run in a clean dry glass revolving pan until bright. Stocks are kept in sealed tins until required for despatch and quantities are given a brief run in the polishing (glass) pan immediately prior to packing.

Information Supplied

The Enquiry Service has dealt with requests for the names of manufacturers and suppliers of plant, machinery, and materials, and also general information as follows:

B.4479. *Equipment for pie manufacture and general bakery lines.* (Isle of Wight.)

B.4481. *Drying and blanching machinery.* (Lancs.)

B.4484. *Apple pomace.* (Ireland.)

B.4486. *Salad cream.* (Denmark.)

B.4487. *Oil-soluble colours.* (India.)

B.4488. *Cereal puffing guns.* (Lancs.)

B.4489. *Label printing machine.* (Southern Rhodesia.)

B.4491. *Cake and pudding mixes and filling dried fruit, currants, raisins, apricots, etc., into cartons.* (New Zealand.)

B.4500. *Cold mix ice cream powder.* (Ireland.)

B.4501. *British Agar.* (Northumberland.)

B.4502. *Hand-operated dicing machinery.* (London.)

B.4505. *Insecticide for "meat flies."* (Yorks.)

B.4506. *Holdover plates.* (Brazil.)

B.4507. *Silicone coating for bakery sheets.* (British West Indies.)

B.4513. *Biscuit manufacture plant.* (Gibraltar.)

B.4514. *Marmalade.* (London.)

B.4515. *Spirally wound containers.* (Lincs.)

B.4518. *Monosodium glutamate.* (London.)

B.4519. *Ice cream manufacture.* (Lancs.)

B.4522. *Fork trucks and stacking trucks.* (Lancs.)

B.4523. *Mixers for glucose, invert sugar, and castor sugar.* (Lanark.)

B.4524. *Soups.* (Brussels.)

B.4529. *Fondant plant.* (South Africa.)

B.4530. *Electric clocks.* (Dorset.)

B.4533. *Mincemeat and lemon curd.* (Glos.)

B.4534. *Pectin plant.* (Cambs.)

B.4535. *Jam filling.* (London.)

B.4536. *Substitute for coconut.* (Lancs.)

B.4537. *Rice milling.* (Lancs.)

B.4540. *Vacuum closers.* (France.)

B.4542. *Table jelly tablets.* (Holland.)

B.4544. *Pulping of soft fruits and necessary equipment, also extraction of apple juice and manufacture of apple pectin.* (Suffolk.)

B.4546. *Polony.* (Yorks.)

B.4547. *Shelling peanuts.* (London.)

B.4548. *Glucose manufacture.* (Northumberland.)

B.4549. *Shredded beef suet.* (Ireland.)

B.4550. *Flour milling.* (Northumberland.)

B.4551. *Bacon, egg grading, poultry preparation, and miscellaneous equipment for the meat and poultry industry.* (London.)

B.4552. *Can labelling.* (Suffolk.)

B.4553. *De-aerating machinery suitable for sauces, salad cream, etc.* (Lancs.)

B.4558. *Automatic continuous sugar cookers, fondant cream cookers, and cream beaters.* (South Africa.)

Information Required

B.4525. *Details of the manufacture of sweetened fats and references to books on the subject.* (Ireland.)

Chunky Marmalade

With reference to the recipe headed "Chunky Marmalade" which appeared on page 307 of the July issue of FOOD MANUFACTURE under the main heading "Marmalade Manufacture," we are informed by the St. Martin Preserving Co., Ltd., of Maidenhead, Berks., that the word "Chunky" is associated with that company's marmalade, its use in relation to marmalade in the particular form used by them being protected by registered trade mark. They are naturally concerned that the word "Chunky" should not become used in its ordinary adjectival sense in relation to marmalade, as this might become exceedingly damaging to their trade and might necessitate embroiling themselves in trade mark or passing off litigation for the protection of their interests.

Recent Patents

639,258. ARNASON, S. J.: Method of drying salt fish.
639,446. RYDER AND COMPANY (MANCHESTER), LTD., T., and FAWCETT, H.: Machine for washing casks, barrels, and like receptacles.
639,462. DETREZ, R.: Machines for filling, corking, or crown-corking, applying capsules to, labelling or otherwise treating, bottles, flasks, jars, and other receptacles.
639,474. CORY, H.: Coffee brewer.
639,481. STEVENSON, B.: Boxes or cartons.
639,555. GENERAL FOODS CORPORATION: Pectin jelly compositions.
639,582. CONSOLIDATED PACKAGING MACHINERY CORPORATION: Machine for closing and sealing slack filled paper bags.
640,275. CLAYTON, K.: Holders for sauce bottles or the like.
640,338. SVENSKA AKTIEBOLAGET GASACCUMULATOR: Cooking stoves.
640,387. FOSTER, S. K.: Process and apparatus for continuously producing French fried foods.
640,435. POLLOCK, I. R.: Culinary appliances.
640,484. FINIZIE, L. T.: Apparatus for cooking food.
640,564. SOC. ANON. FRANÇAISE POUR LA SÉPARATION, L'EMULSION, ET LE MÉLANGE, PROCÉDÉS S. E. M.: Apparatus for homogenising fluid pasty mixtures.
640,573. PIRHONEN, H.: Procedure in making and preserving juices of fruit and berries.
640,637. NORDLUND, K. F.: Steam boilers.
640,865. HILLARY, J. B. (Wiemer, H. K.): Roller mills for grinding chocolate masses.
640,897. GOLDEN STATE CO., LTD.: Process of treating flowable foods containing fats.

Abstract of a Recent Specification

Pectin Jelly Composition

This invention relates to pectin jelly compositions and more particularly to such compositions of the "low-sugar" type in which the jellies contain little or no sugar as contrasted with a sugar content of 60 to 70 per cent. in pectin jellies as generally known and used in the more conventional pectin fruit jams and jellies.

For a long time it was believed that pectin jellies could not be made without a relatively large amount of sugar, but it has been found comparatively recently that pectin which has been demethoxylated to a sufficiently low degree of esterification will form jellies in the presence of alkaline earth ions or other metallic ions regardless of whether sugar is present or not. These low-methoxyl pectins are useful for making jellied fruit and vegetable salads, jellied soups, *consommé*, aspic, and other jellied products in which large amounts of sugar are incompatible.

It has been observed that the low-sugar pectin jellies are much more susceptible to syneresis or "weeping" than high-sugar jellies. All pectin jellies are susceptible to syneresis to some extent, but high-sugar pectin jellies do not exhibit it to any great degree if properly prepared. With low-sugar jellies, on the other hand, the usual precautions are insufficient to reduce syneresis to an extent where it is no longer detectable or objectionable, which is especially true if little or no sugar is used in the jellies.

The object of the present invention is to minimise syneresis in low-sugar pectin jellies and particularly in such jellies which are canned or otherwise sealed for distribution or storage for relatively long periods of time.

In accordance with the invention a method is provided of making a composition for the jellification of edible mixtures of the low-sugar type which comprises admixing a pectin which has been demethoxylated to an extent sufficient to form a jelly in the presence of low concentrations of sugar, with a sufficient quantity of pectin demethoxylated to a lesser degree to reduce syneresis in a finished jelly.

At the low sugar concentrations contemplated, the latter pectin (which has a higher equivalent weight than the former) appears not to participate appreciably in the bonding or other action involved in the formation of the jellies, but does have a definite and important effect in minimising or preventing syneresis.

Such relatively inert pectin may be employed with substantially equal effectiveness whether the low-equivalent-weight pectin is caused to gel by the presence of alkaline-earth ions or of other metallic ions such as aluminium, iron, manganese, or nickel. It is preferable, however, to employ edible calcium or magnesium salts for the purpose of jellification. Also any high-equivalent-weight pectin can be used, but it is preferable to use pectins having equivalent weights between 400 and 600 because of their greater viscosity. The high- and low-equivalent-weight pectins may be obtained from any of the usual sources, for example, citrus peel and apple pomace.

639,555. *General Foods Corporation.*

Recent patents have been selected from the "Official Journal of Patents" and are published by permission of the Controller of H.M.S.O.

Trade Marks

SUNTONIC.—685,343. Fresh fruits and fresh vegetables. **Broome and Green (London), Limited,** 27, James Street, Covent Garden Market, London, W.C.2; Merchants.

MAUPIC.—685,608. Preserved, dried and cooked fruits and vegetables; and jellies, jams, marmalade, piccalilli, and pickles. **Maud Turnbull,** 11, Lindsay Road, Leicester; Manufacturer.

RINGMASTER.—685,810. Non-medicated confectionery and chocolates. **The Parkside Confectionery Company, Limited,** Angus Hall Works, Liddell Terrace, Gateshead, 8, County Durham; Manufacturing Confectioners.

GINOATIS.—685,879. Biscuits made from oat products (not being biscuits for animals). **Farmhouse Bakeries, Limited,** The Biscuit Factory, Henfaes Lane, Welshpool, Montgomeryshire; Manufacturers.

PARMESUN.—686,127. Mixtures consisting principally of wholemeal ground rusk for use in making rissoles. **Solflower, Limited,** The Trading Estate, Rogerstone, near Newport, Monmouthshire; Manufacturers.

QUESTOEL.—686,253. Edible oils and edible fats. **Bushell Bros., Limited,** 8, Botolph Lane, London, E.C.3; Merchants.

Trade marks have been selected from the "Official Trade Marks Journal" and are published by permission of the Controller of H.M.S.O.

New Companies

F. C. Murrell (Catering Equipment), Limited. (481703.) 13, Station Parade, Queensbury, Edgware, Middx. Nom. cap.: £100 in £1 shares. Dirs.: F. Murrell and Mrs. D. Murrell, 3, Kenilworth Drive, Boreham Wood.

Grain Storage Installations, Limited. (481704.) Lloyds Bank Chambers, East Grinstead, Sussex. Nom. cap.: £100 in £1 shares. Dirs.: C. H. Tyler, Cortina, Chignal Road, Chelmsford; C. E. Latter, Nash, Keston, Kent; K. C. J. Burrell, Maynotts, Rickstones Road, Witham, Essex.

Milford Haven Bulk Fish Supplies, Limited. (481712.) Nom. cap.: £10,000 in £1 shares. Dirs.: not named. Subs.: G. E. Perrott, 34, Warren Drive, Eastcote, Middx.; Elizabeth Holden, 3, Kingsend Court, Ruislip, Middx. (clks.).

Courtney (Catering Contractors), Limited. (481731.) 129, Union Street, Oldham. To take over business carried on as "Regent Catering Service" at High Bury, Old Road, Mottram-in-Longdendale, Cheshire. Nom. cap.: £6,000 in £1 shares. Permt. dirs.: G. H. Fisher, High Bury, Old Road, Mottram-in-Longdendale; F. Schofield, 129, Union Street, Oldham.

George Harlow, Limited. (481738.) 17, Lamb Street, Spitalfields, London, E.1. To take over business of a fruit and vegetable merchant and commission salesman carried on at Spitalfields, E., by Margery M. Harlow. Nom. cap.: £10,000 in £1 shares. Dirs.: T. K. M. Harlow, Addlestead Farm, East Peckham, Kent; J. A. E. Edwards, 69, Slades Hill, Enfield, Middx.

Harry Ingram and Son, Limited. (481741.) 70, New Road, Kidderminster. To take over business of pork butchers carried on as "Harry Ingram and Son" at Kidderminster. Nom. cap.: £10,000 in £1 shares. Dirs.: H. F. Ingram (gov. dir. and ch.) and Mrs. D. Ingram, Kingsley Villa, Chaddesley Road, Kidderminster.

Langley Fruit Company, Limited. (481752.) 52-54, High Holborn, London, W.C.1. Nom. cap.: £100 in £1 shares. Dirs.: to be appointed by subs. Subs.: D. G. V. Burt, 7, Martens Close, Bexleyheath, Kent (Acct.); J. A. M. White, 24, Brunswick Crescent, London, N.11 (clk.).

A. C. Thomas, Limited. (481766.) Clifton House, Neath Abbey, Glamorganshire. To carry on business of collecting, grading, and distributing eggs, and that of an egg packing station, etc. Nom. cap.: £500 in £1 shares. Dirs.: A. C. Thomas and Mrs. M. Thomas, Clifton House, Neath Abbey, Glamorganshire.

Chapman's Bakeries, Limited. (481780.) 2, Plumstead High Street, London, S.E.18. Nom. cap.: £5,000 in £1 shares. Permt. dirs.: A. R. Chapman (ch.) and Matilda M. Chapman, 2A, Griffin Road, London, S.E.18.

Chicle, Limited. (481784.) Victory Works, Albion Street, Bury. To carry on business of manufacturers, merchants, importers and exporters of confectionery, etc., formerly carried on as Chicle Products, Limited. Nom. cap.: £5,000 in £1 shares. Dirs.: R. Ashworth, Glengarry, Green Mount, near Bury (permt.); W. Stockton, 11, Porter Street, Bury; A. Sellers, H. Law, H Ashworth, and J. Davis.

Taken from the Daily Register, compiled by Jordan and Sons, Limited, Company Registration Agents, 116, Chancery Lane, London, W.C.2.